

## Meeting Summary and Notes

# ISO TC184/SC4/ WORKING GROUPS

**Orlando, Florida, USA**

**1998-02-02/06**

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## **WG2: PARTS LIBRARY (PLIB)**

### **01 Opening of the meeting**

G. Ehinger opened the meeting February 2<sup>nd</sup> at 10:30 am and thanked all attendees for coming.

### **02 Adoption of agenda**

The following agenda was adopted:

- 01 Opening of the meeting
- 02 Adoption of the agenda
- 03 Roll call of experts
- 04 Organizational issues
- 05 Quality in ISO 13584
- 06 Joint meeting WG2/WG10
- 07 Discussion on early comments on Part 26 and Part 101
- 08 Joint meeting WG2/WG12
- 09 Part 24, Presentation of an example
- 10 Report on national activities
- 11 Implementer issues
- 12 Joint meeting WG2/WG3-T12
- 13 Any other business
- 14 Closing of the meeting

### **03 Roll call of experts**

The following experts attended the meeting (N274):

John King	Guy Pierra	Craig Brubaker
Zahn Junfeng	Ben Kassel	Clayton Rains
Hitomi Matsusima	Mamoru Kawanobe	Frans van Noesel
Ekki Zwicker	Robert Schuler	Meinolf Gröpper
Christine Grafe	Bruce Ladewig	Gerald Radack
Gerd Ehinger		

### **04 Organisational Issues**

- Gerd Ehinger reported about the Conveners and PPC nmeeting on Sunday and pointed out that only those WG2 members can vote who were nominated by their national bodies (N 362)
- WG2 updated the Project Leader and editors for all Parts of ISO 13584 (N 363)
- M. Kawanobe presented his paper (N364) to be presented at the IEC meeting in Geneva on February 11<sup>th</sup>, 1998.

### **05 Quality in ISO 13584**

G. Radack reported briefly about the status of quality issues within SC4.

### **06 Joint meeting WG2/WG10**

R. Schuler explained the status of his Work on Part 102. After a long discussion WG2 decided to support all APs and conformance classes and leave it to the suppliers and end users which AP and which conformance class they want to support.

It was also decided that after the development of this part a new VEP - Part 103 - should address the exchange of STEP geometry independently of the specific STEP AP .

**07** Discussion on early comments on Part 26 and Part 101

The early comments were discussed. The final decisions will be made and documented in Bad Aibling.

On the basis of the discussion, Gerald Radack accepted to prepare the (F)DIS version of Part 26 for Bad Aibling.

Then the status of the other parts was discussed.

**Resolution Orlando #1:**

„WG2 achieves consensus to raise Part 31 in accordance with the new ISO regulations after the editing work directly as IS to Geneva.“

unanimous

Ben Kassel accepted to prepare the final IS version of Part 31. He will also investigate the feasibility to develop a new language binding in Java. This topic will be discussed in bad Aibling. All experts interested are invited to contact Ben Kassel (KASSEL@OASYS.DT.NAVY.MIL).

**08 Joint meeting WG2/WG12**

- The first point was about the consistency of the interpretation process across all STEP APs. It is the goal of the AP interpretation guidelines to ensure this consistency. This document should gather
  - The rules and guidelines for the interpretation process, and
  - The "standard" interpretation for similar requirements.

It was agreed that the second aspect should constitute a normative annex to the document. It was also agreed that the first example of "similar requirements" associated with a "standard" interpretation would be the use of PLib services by STEP APs as developed by Gunter Staub for AP 212/214. This will facilitate the use of PLib services by all the APs. Gunter Staub accepted to prepare the document to be integrated in the STEP interpretation guideline document.

- Then the status of the resource model developed in WG2 was discussed. WG2 proposed to hand over the responsibility of Parts 20, 26 and 42 to WG2. No final decision has been made so far.

**09** Part 24, Presentation of an example

G. Pierra presented a paper developed with Eric Sardet and Yamine Ait-Ameur on Part 24 (N365, N366) explaining the example of Part 24, Annex P.

**10 Joint Meeting WG2/WG3 (Process Plant)**

It was first agreed that both AP227 and AP221 will integrate the referencing mechanism to PLib services as defined by G. Staub for AP 212/214.

The second point was the definition of AP221 standard object and properties by a PLib-compliant dictionary. It has been agreed that AP221 should contain an ISO 15848-4-compliant dictionary at the minimum for those application objects

and properties of AP 221 that belong to both AP221 and AP227 or for those that correspond to P&ID

## **11 Joint Meeting WG2/Parametrics**

Parametrics informed about the state of their work and B. Anderson presented his paper „Design Intent for Mechanical Design“ (N 367). After discussing the concept of ISO 13584-20 (Expressions) B. Anderson agreed to proof the usability of Part 20.

WG2 proposed to prepare an alternative framework document to be evaluated by the parametric group. The parametric group asked to have some more time to discuss this proposal internally.

**NOTE:** After the meeting the parametric group informed WG2 that the development of an alternative framework document was not considered as desirable.

## **12 Report on national activities**

### **12.1 Japan:**

M. Kawanobe gave a report on Japanese activities (N 368)

### **12.2 US**

R. Schuler gave a short report on US activities.

### **12.3 Switzerland**

E. Zwicker gave a short report on Swiss activities.

### **12.4 France**

G. Pierra gave a short report on French activities.

## **13 Any other business**

Next meeting:

WG2 will meet in Bad Aibling June 8<sup>th</sup> –12<sup>th</sup>, 1998

## **14 Closing of the meeting**

G. Ehinger closed the meeting February 4<sup>th</sup>, 1998, 17:00 .

Minutes submitted by Gerd Ehinger

### WG3: PRODUCT MODELING - PLENARIES

#### Attendees

Last Name	First Name	Country	Monday AM	Monday PM	Thursday PM
Adam	David	UK	x		
Amaral	Chuck	USA	x		
Ang	Jenny	Singapore			x
Arutz	Theo	Netherlands	x		
Bair	Richard	USA	x		
Burkett	Bill	USA		x	x
Cain	Bill	USA	x		
Carroll	Greg	USA		x	
Conkol	Gary	USA		x	x
Crawford	Jim	USA		x	
Danielson	Mike	USA	x	x	x
Dreisbach	Rodney	USA	x	x	
Dunford	John	UK	x		x
Endres	Michael	USA		x	
Fisher	Robert	USA	x		
Freschette	Simon	USA		x	
Frisch	Harold	USA			x
Goult	Ray	UK		x	x
Grafe	Christine	Germany	x	x	x
Gruttke	William	USA	x		
Guy	Jeff	UK	x	x	
Haas	Wolfgang	Germany		x	
Hayford	Mike	USA		x	x
Hiraoka	H.	Japan		x	x
Holm	Torboru	Sweden	x	x	
Hunten	Keith	USA		x	x
Ishikawa	Yoshiaki	Japan	x		x
Johansson	Mathias	Germany		x	
Kalyanaparupathy	Venkatraman	USA		x	
Kimber	W. Eliot	USA	x		
Kindrick	Jim	USA			x
Kjellberg	Torsten	Sweden		x	
Kline	Steve	USA	x		
Kupke	Steve	USA		x	x
Labat	Audre	France	x		
Lauro	Luciano	Italy		x	x
Leal	David	UK	x		x
LeClair	Lee	USA	x	x	x
Magnusson	Jarl	Sweden	x		
Mays	Jim	USA			x
Mohrmann	Juergen	Germany	x	x	x

Moreno	Anna	Italy	x	x	x
Nazemets	John	USA			x
Newling	Nigel	UK	x	x	
Palmer	Mark	USA		x	x
Paul	Greg	USA		x	
Pearson	Mark	UK	x	x	
Philipp	Martin	Germany	x	x	x
Polikaitis	Linas	USA			x
Price	David	USA		x	x
Radack	Gerald	USA	x	x	x
Ragnes	Jorulv	Norway		x	
Rivers-Moore	Daniel	UK	x		x
Sandsmark	Nils	Norway		x	x
Schilli	Bruno	USA			x
Shaw	Nigel	USA			x
Sugimura	Nobohiro	Japan		x	
Silvili	Bruno	Germany	x		
Smits	Loek	Netherlands	x	x	x
Stanton	Ed	USA		x	
Staub	Gunter	Germany			x
Storer	Graham	UK			x
Suzuki	Masaru	Japan			x
Swindells	Norman	UK		x	x
Tocco	Mark	USA		x	
Turner	Tim	UK	x		x
Tutton	Phil	UK	x	x	
Viel	Christophe	France		x	
Warren	Tom	USA			x
Wasmer	Anna	Germany		x	
Wenzel	Bernd	Germany			x
Wise	Timothy	USA			x
Ziolko	Glen	USA	x		x

### **Monday 1030-1200 session**

#### General business

The meeting opened at 1040 with round table introductions.

Tim Wise was appointed as note-taker.

Radack reviewed the voting procedure--consensus is preferred if possible (so we do not have to vote), but he will poll experts if required. He noted that the official list of experts is in a document from the Secretariat (SC4 N635). One needs to be on the list to be able to vote.

The agenda was reviewed, and there were no additions or changes.

Radack announced that Len Slovensky has resigned as leader of T7/11—volunteers to take over should contact him. Nils Sandsmark has already volunteered to take over T21 (subject to confirmation by the team), and Daniel Rivers-Moore has volunteered to take up leadership of T14.

Radack requested, and the team leaders agreed, that there would be meeting with team leaders Wednesday during lunch.

AP coordination, schedule issues and dependencies

Martin Philipp presented an AP-AIC coordination chart. It contained two tables:

The first table linked APs to the AICs being used by the APs

The second table listed part numbers, names of individuals involved, etc.

The chart can be found on the Web at: [http://www.dik.maschinenbau.tu-darmstadt.de/forschung\\_eng/ap214/aic\\_ap\\_coordination/aic\\_ap/index.html](http://www.dik.maschinenbau.tu-darmstadt.de/forschung_eng/ap214/aic_ap_coordination/aic_ap/index.html).

It was agreed that AP coordination issues would be folded into the evening plenary discussion.

Project status database: Radack passed out status sheets. There was a concern about knowing project status viz a viz grandfathering of APs.

Expert attendance list: It was noted that many attendees are not on the list of experts. There is uncertainty among some as to how to be nominated as an expert. Radack agreed to send out a list of national body contacts to the WG3 exploder.

Radack announced that the chair of SC4 is considering realigning all of the schedules to streamline larger meetings and to go to a single plenary.

SEDS issues: Radack noted that there are many old SEDS issues. It was agreed that they be handed out to teams for resolution by the end of the week. [The AP 203 SEDS issues were later given to Larry McKee; the AP 201 and 202 SEDS issues were given to Linas Polikaitis.]

The session adjourned 1143.

#### **Monday 1700-1900 session**

Proposed Type III Technical Report: Implementation subsets of AP 203 conformance class 1

Larry McKee made a presentation on a Proposed Type III Technical Report: "Implementation subsets of AP 203 conformance class 1." A draft of the proposed TR is on SOLIS as WG3 N713.

McKee explained that when AP 203 was originally being developed, there was a problem with combinations of conformance classes. There must be a conformance class (CC) for each combination of capabilities that must be supported by a conforming CAD system. The original decision was to limit AP 203 to four CCs, but for practical reasons they raised the number of CCs to six. However, CAD vendors have implemented a relatively small subset of product data—they have not implemented all of CC 1. The preprocessors are producing legal CC 1 files, since there is no requirement that they output every entity in a particular CC. On the other hand, postprocessors have to read and process anything in CC 1. CAD vendors have resisted this and thus their products will not be conformant to AP 203. Due to errors or deficiencies in AP 203, the implementors are also making changes to AP 203 that are becoming *de facto* standards, but are leading problems with anti-trust laws, etc.

WG3 N713 documents the subsets within AP 203 that are actually being used by CAD vendors and is intended to form the basis of an implementors' agreement. It is consistent with ISO rules to publish such an agreement as a Type III Technical Report (TRIII). A TR passes through the same process as any other ISO document. This has not been done before in the STEP world. The reason for doing it now is expediency. Options include Technical Corrigenda, Amendments, and new editions. Because of: the number of SEDS issues, other extensions desired by the users, etc., these approaches will take more time. We also need to avoid the perception at this point that AP 203 is undergoing rapid change. A TRIII allows us to make changes to the CCs while leaving the actual standard unchanged.

If we go through with the Type III TR, ITI Michigan can conformance test to the new CCs.

This was close enough to a change of requirements that Sharon Kemmerer, at the time, said that we could not do a TC. We have to do an amendment.

There are three subsets specified in the TR:

Subset 1: Absolute minimum: rudimentary product identification and structure

Subset 2: Product identification structure and affectivity

Subset 3: Engineering change identification

Discussion

Wasmer: Is any change necessary to standing documents?

McKee: There is a 99.999% chance that they will change Part 303 to align with the new conformance classes.

Viel: Do you have ideas of changing inclusion of CCs 2-6, which implies CAD systems must generate the minimum CC1 entities.

McKee: Minimum conformance according to the TR will be subset 1 + advanced B-rep.

Q: What is difference between minimum subset and AP 204?



McKee: There would be minute differences because of the product structure and product id reqs of 203. 204 does not require a person and organization as a design owner.

Mohrmann: Is a normative reference to a TR Type III allowed?

McKee: Need to check on this.

Q: What is the impact on new edition or amendment of 203? Will it be published along the lines of these CCs?

McKee: There is a PWI study project to take a look at all proposed changes to AP 203 and see how we will accommodate them. Options are TCs, amendments, new editions. May do some or all of them to 203.

Wasmer: Will this be applied to fix problems with modules?

Price: The aim is to fix conformance class problem but this idea will not be applied to modules.

Q: What is the difference between subset 1 Class 6 and Part 204.

McKee: There would be minute differences because of the product structure and product id requirements of AP 203. AP 204 does not require a person and organization as a design owner.

Q: What are the differences between Type I, II and III TRs?

McKee:

Type I – required support cannot be obtained for publication of an IS despite repeated efforts

Type II – still under technical development or other reasons

Type III – TC has collected data at different time from when published as IS

This is defined in the foreword to N713. Permission for Type I and Type II required approval of ISO TMB but not Type 3. Part 303 is a Type II TR. Vendors will be able to claim conformance to AP 203 if conform to the proposed TR. The aim is reduce what vendors have to do to be legal.

There were no objections to proceeding forward with the TRIII. Some people wanted reassurance that a TRIII has the same weight as an International Standard. McKee replied that clarification of the issues and facts needs to be done to assist and support the ballot process.

Collaboration agreement with IAI

Wolfgang Haas said that the agreement has been drafted and that a final discussion would be held Tuesday. It was agreed to place it on the agenda for Thursday. [This discussion was not held.]

Compliance with STEP

Christophe Viel gave a presentation on WG11, summarized as follows.

The scope of WG11 includes EXPRESS, implementation methods and conformance testing.

Conformance testing is an activity to assess whether a given implementation satisfies the requirements identified in the standard. Conformance testing can be done either by an end user or an independent laboratory. By doing with testing laboratory, there is no need to repeat testing for each end user. The objective of a laboratory program is to provide services for assessing the conformance of implementations and certifying the implementations, instead of end users having to do their own testing. Conformance testing focuses on common points of interest between all end users.

This approach implies that:

Requirements must be precisely identified.

For an AP, there is an infinite number of requirements that may be tested.

The ATS must reflect the requirements that have been identified as major.

The testing method and test results must be independent of the tester.

The procedure and requirements are standardized in Parts 31, 32, 34, and 35.

Responsibility is split as following:

WG11 is the home for the 30 series parts.

WG3 is the home for the AP and their ATS

The Quality Committee (QC) is the home for AP and ATS development guidelines

ATS development

Viel continued as follows.

It has been found that AP and ATS benefit from simultaneous development.

Individual test cases represent the first instance of the data in the AP. Creating them helps the validation of the model.

Decomposition of the domain into UoF relies on the same strategy for the decomposition of the ATS into groups of test cases.

There was criticism of ATS guidelines on level of coverage. Came to following solution at last meeting: The test cases must correspond to each AO identified in the AP. How an implementation deals with an AO is reflected in the set of criteria defined in the test case.

#### Claims of Conformance

Swindells said that the question comes not so much with products. It came up with a project in which people said "we have used STEP for data exchange" when they haven't actually used the IRs.

Shaw replied that we do not have a trademark on word of STEP. STEP is a licensed trademark of Siemens for a PLC language. They at first objected to the use of "STEP" in the context of ISO 10303. 2 or 3 later, they withdrew their objection to things connected to ISO 10303 and international standards.

Palmer said that some vendors were at the Chester presentation and also went to other arenas, claiming that they have STEP compliant warehouses.

Shaw said that you have to work hard to find the word "STEP" in ISO 10303. Once or twice the following issue came up: "What can you expect from a system implemented based on EXPRESS?" Once or twice references were made to a Part 20 that says: "Here are the requirements for any system derived from EXPRESS." There may be some value to defining Part 20 in that light to give consistency of implementations.

Dunford proposed the need to distinguish between a formal definition based on compliance with ISO 10303 and general usage of the methods used in development of STEP standards.

Swindells volunteered to draft a position statement for the Thursday meeting. (This was not done due to lack of time.)

#### Adequacy of methods for achieving interoperability

John Dunford presented the following on the NATO perspective on the adequacy of methods for achieving interoperability: In order for information to be distributed through the life cycle there is a need for consistent linking and referencing. The current SC4 projects have several sets of activities needing linking and coordination of information. SC4 will have to move quickly to establish and maintain a coherent approach to these approaches.

Dunford proposed that WG3 adopt the position that modules will become the target vehicle for extending and improving AP interoperability over the product life cycle. He also said that WG10 should establish a method for WG3 members and others to find user requirements into core modules developments.

Burkett said that interoperability is an implementation issue.

Price disagreed. He said that WG10 and WG11 are information technology providers to customers and customers set requirements. Burkett Customers concerned with content and functionality and not methodology.

Dunford said that a way of setting requirements is not available. A member of the audience said that WG10 is coming up with a method. Burkett said we need a "requirements architecture." Radack pointed out that an attempt to do a requirements document for SC4 in 1997 failed due to lack of resources. Price said that he is now responsible and will revive the task.

Shaw should modularization be directed to "as-is" or to "as-should be."

Some felt that there is a need for a formal way of inputting requirements. Price said that WG10 would describe current activities for WG3 at the Thursday plenary.

Fisher said that technical coordination between APs and between SC4 groups is needed. As a means for gaining technical understanding, he proposed that technical discussions be held on focused issues.

There was support for cross talk in order to be more open to core model development.

It was agreed that Fisher, Mohrmann, Dunford and Radack would discuss offline and prepare a proposal for the Thursday session.

#### **Thursday 1700-1900 session**

##### WG10 Presentation

##### Application Modules

David Price gave a presentation on application modules.

Price presented results of previous workshops including agreement to proceed by experimentation.

Development should continue parallel to SC4 and need for supporting organization under umbrella of SC4

Price a schematic of the AP modularization approach.

One aim is to enable vendors to implement smaller subset than is possible at present.

Price presented a plan to develop an initial set of modules.

#### Discussion

Burkett asked if overlaps between modules will be allowed. Price answered that overlaps will exist but the objects will only be documented in one place.

Price said that AMs play a role similar to AICs. The aim of the current effort is to resolve technical issues and not be concerned with publishing issues and ownership problems.

Moehrmann asked about the subdivision mechanism. Price said that the changes allowed in a subdivision would be limited to scope refinement—the technical content must not change, only the documentation.

Trying to enable modularize APs but not prescribe that they should be done this way. Proposal is not dissimilar to AICs but benefit is that waiting for second AP is not necessary. Tim Turner difference is that Shipbuilding core model is at ARM while AMs are interpreted from IRs. Shipbuilding will look at how to extend BB approach with AIM mapping.

Radack if scope refinement what happens to old version. Now have two modules ( say) in new version.

#### Structure for SC4 standards

Bernd Wenzel made a presentation on the work to develop a structure for SC4 standards.

The preference is to have one logical data store from which anyone can extract the data that he needs.

The aim is "Lego APs."

The integration model is at a higher level of abstraction than the application model. If the integration model is close to the current IRs then we are close to Price approach.

[A user] needs an interface model which is a subset of his application data model that needs to be integrated (not everything needs to be integrated).

Finally, additions are needed to extend integrated data model as new requirements appear.

#### Discussion

Dunford asked how long it would be before the structure would be available and usable.

Wenzel said that the "technical answer" is 1.5 to 2 years to document the methodology and the first generation integration model. He was not sure about the "political answer."

Burkett asked what is standardized—components may be from different committees.

Wenzel said the interface model should be the responsibility of SC4.

It was asked how the new integration model differs from the current Integrated Resources (IRs). Wenzel said that the integrated model may be as primitive as in EPISTLE structures.

Burkett asked what makes EPISTLE model better than IRs. Wenzel replied that the EPISTLE model has extremely primitive structures and enables one to add attributes as new entities to achieve upward compatibility

#### SGML and Industrial Data

Nigel Shaw made a presentation on a preliminary work item (PWI) on the general subject of industrial data and product documentation. WG3 T14 is the focus of this activity. The main activity is to link EXPRESS and HYTIME to be able to hyperlink to points in a Part 21 file and have links into SGML files. An SGML string EXPRESS resource will be developed and extended to enable multimedia to be linked to STEP. The use of XML will enable Web browsers view EXPRESS data.

There was no discussion.

#### Development of STEP 2000

Ishikawa announced a framework that is to relate the industrial world to the information world based on requirements of the hierarchical customer supply chain.

There was no discussion.

#### Interoperability

John Dunford proposed that WG3 take the following positions:

Modular architecture should be recognized by SC4 to achieve interoperability

WG3 should take leading role in determining module requirements and priorities

There was no vote taken.

Mohrmann proposed that experiment be conducted with open technical forums. The aim is to agree on and document a common set of requirements. It was agreed to try this in Bad Aibling.

Mohrrman presented a preliminary list of topics. He proposed, and there was no dissent, that "product identification" and "link to organization" be the topics for Bad Aibling. The time of workshop was set for

Tuesday morning. It was agreed that other WG3 events would not be excluded from this time period. However, teams that are meeting in parallel should be represented at the workshop if possible.

#### Bad Aibling Schedule

It was agreed that WG3 plenaries would be held Monday 1030 to 1200 and 1700 to 1900, and Thursday 1700 to 1900. The last half hour on Monday would be for a team leaders meeting.

AEC Coordination The former AEC subteams are now separate teams. Palmer reported that they met Thursday morning, and agreed that there is still a need for an AEC coordination mechanisms. They will meet again on Thursday morning in Bad Aibling.

#### Team Reports

See WG3 N736 for the team reports.

### **WG3/T1: SHAPE REPRESENTATION**

See WG12 SHAPE REPRESENTATION (with WG3/T1)

### **WG3/T2: PRESENTATION**

WG3/T2 did not meet.

### **WG3/T4: MATERIALS**

**Attendees:** Dr. Ing. Anna Moreno (AM), Italy (Project Leader); Dr. Norman Swindells (NS), UK (Deputy Project Leader), Dr. Edward Stanton, U.S.A.

#### Review of Progress

The report of the Florence Meeting was approved and progress with the actions was reviewed.

AITEAR Project (Esprit Project 22038) NS reported that he had identified Professor Stephen Gray, Nottingham Trent University, as a UK expert on computerized information in the garment industry and would be meeting with Professor Gray on February 19<sup>th</sup> to discuss possible projects and collaboration with the AITEAR Project. The potential application of the results of this project to composite materials was discussed. A copy of a paper produced by the project was distributed ("A Model for Cloth Buckling and Drape". J. M. S. Dias, M. N. Gamito and J. M. Rebordao) and a Newsletter is also available. There is a

Website at [www.aitear.com](http://www.aitear.com).

ISO 10303-223 NS reported that he had held several meetings with representative groups from the castings and forgings industries in the UK. These meetings had identified common problems with data exchange between suppliers and prime customers and an interest in developing cooperative actions to use STEP technology to solve these problems. Further discussions and meetings were planned to establish project proposals.

MOLDSTEP A proposal for financial support had been submitted to the ESPRIT Programme of the European Commission but the outcome is not yet known.

POSC/CAESAR Further discussions had been held with the Project Leader and the materials expert of the POSC/CAESAR Project. This has strengthened the good relationships established at the Florence meeting and provided the basis for further collaboration and consultation.

Materials Services NWI Proposal The problem of obtaining up-to-date versions of the Summary Proposal has continued and AM had made several requests for copies of the document which had not been met.

#### Review of FDIS of ISO 10303-45: Materials

The FDIS of the ISO 10303-45 was released by ISO in December after a delay of a year from the sign-off by SC4. There were no changes from the document as originally submitted for qualification in October 1996 and so it was not clear what justification there could have been for this delay. WG13 Production Support identified 49 issues with the FDIS document which arise from the changes in the Supplementary Directives during the time of the delay. So the FDIS as issued by ISO no longer conforms to the requirements for an ISO Standard. Most of these are editorial issues that can be corrected by use of the latest versions of the LATEX Templates. A procedure for dealing with the revisions was agreed with the Leader of the Qualification Team. Materials and Properties in APs An important outcome of the new proposals for AP Modularization is that, if the proposals are accepted, it should be easier to establish consistent ways of modelling materials properties and ensuring that these models are used correctly in new Application Protocols. In addition to the proposals for modularization there is also a proposal to develop interpreted modules directly from the Integrated Generic Resources (Part 40 series) without going through the stages of an ARM which is mapped to the IGRs. The combination of these two innovations should provide a lower barrier to enable the modelling of product properties to meet the requirements of sectors of the materials industries, considerably speed up the development of standards and the development of implementation software.

NS is to demonstrate an example of a property module, produced by the direct use of the IGRs, at the next meeting at Bad Aibling.

#### Joint Meeting -T4 Materials and T9 Engineering Analysis

**Attendees:** T4 Anna Moreno(Italy), Norman Swindells (U.K.), Ed. Stanton(U.S.A.); T9 Keith Hunten(U.S.A.), Rodney Dreisbach (U.S.A.) Peter Wilson (U.S.A.); David Leal, (U.K.)

The purpose of the meeting was to discuss the proposals for a New Work Item for materials information. The meeting took place in two sessions, one in the morning and one in the afternoon. Hunten, Moreno, Swindells, Stanton and Dreisbach were present for both sessions. The documents presented for discussion were: ISO TC184/SC4/WG3 (N707) Proposal for an SC4 New Work Item; ISO TC184/SC4/WG3 (N716) Application Protocol: Materials information for products.

Leal reported that he had revised the proposal for the NWI and had attempted a first draft of an ARM with instantiation of data from Mil Hdbk-5. The name had been changed to Materials Information. The main changes since Florence were to take out of scope all references to testing and testing methods and to provide a prototype instantiation of materials classes.

Moreno expressed strong concern about the methodology of cooperation and lack of discussion. She was concerned that the document has reduced the scope to information from materials handbooks and includes mistakes such as the omission of uncertainty which is available in ISO 10303- 45.

Hunten was also concerned that the document has not been available for discussion. He regarded the document as a starting point and expects conclusion of the proposal only by the end of the year. Hunten would not support the current document Following a discussion on whether test data had been agreed to be removed at Florence it was agreed that it had not. Leal accepted that limiting the stated scope to handbook data is not correct and is misleading.

There was a discussion on ways of controlling the potential complexity and a re-presentation of results of agreement at Florence (Minutes of Florence meeting, page 5). There is a problem of the choice of tests and test samples appropriate to a stage of the life-cycle and appropriate to a

product. It was agreed that concentration one stage of the life cycle is appropriate provided that it leads to future application to other stages. There is a question of how to allow for reference to other applications.

There was a discussion on the role of class libraries and class structures. Swindells argued for use of product structure based on the ISO 10303. Stanton argued for class based classification of existing materials classes derived from existing methodologies and practice of standardization bodies. Moreno argued for a product based approach. Stanton agreed that there is always a product. Stanton supported the benefit of a modular approach. Moreno proposed an EXPRESS file for each property. Stanton did not agree but accepted the view of Swindells that modular approach could cope with differences between different properties.

Leal proposed a taxonomy of tests with different types of information relevant for different types of tests. There is a problem of getting to grips with this as a proposal for an AP. To produce an exchange file, the taxonomy would be reduced to a classification structure with mapping to particular structures in STEP. Rather than produce taxonomy it should be done in tabular form. Swindells said that this is more like P-Lib and this does not give the structure to associate metadata with a test result. Moreno pointed out that if the data is in a table it is not computer sensible.

Stanton thought that the proposal of Leal for a dictionary is too stiff. The concept of a dictionary and a thesaurus is central to this proposal but it must not be too restrictive. Leal agreed that the model structures of P-Lib deal with standard tests etc but actual test and actual results are also needed. Moreno suggested that the relevance of a dictionary of standard tests will be limited because of the number of different standards. Swindells proposed that the emphasis should be on the STEP side but the problem was where to strike a balance. The agreement at Florence was that a dictionary should be concerned with terminology.

It was agreed to concentrate the scope on testing at the stage of detailed design but the project should be carefully scoped to achieve results in a manageable time scale. There are questions of the availability of resources within an objective time frame.

It was agreed that Swindells, Hunten and Stanton would review the document N707 and produce some proposals for its revision. The discussion of the scope of the NWI was continued in the afternoon session with the addition of other members of the T9 Project Team.

The stages in the life cycle of a product were determined to be:  
-conceptual design, detailed design, verification of design, manufacture, test, maintenance, disposal.

It was agreed that the NWI should be limited to detailed design and verification because these stages required most testing.

Each stage in the lifecycle involves the combination of several views. Each one of these views requires a collection of tests. For each test there is :

- test method - resources available from Part 49
- test sample - resources available from Part 41, 42,43 and 49
- results - resources available from Parts 41, 45, 43

It was agreed that the priority should be to complete the NWI proposal for ballot. It was agreed that the current document (N707) should be reviewed by the BSI AMT/4/6 on 18th February, with D. Greenfield present (Action: Swindells to brief Greenfield before the meeting). The document will also be reviewed by a group at LMTAS (Action : Hunten) and by Italian experts (Action: Moreno). The revised document should include the AAM (Action: Greenfield).

The results of these reviews have to be ready by the end of February. The Project team will produce a revised Summary which has to be available on SOLIS well before the Bad Aibling meeting.

#### Joint Meeting -T4 Materials and T7/119 Manufacturing Technology

**Attendees:** T4 A Moreno (Italy), N. Swindells (U.K.); T7/11 W.B. Gruttke (U.S.A.); W. Cain (U.S.A.) G. Conkol (U.S.A.), G. Radack, (U.S.A.), N. Sugimura (Japan)

**Form Features** The proposals from BSI AMT/4/6 that the modelling of form features be included in ISO 10303 were discussed. Cain and Gruttke confirmed that this topic had been re-examined several times recently. Parts 224 and 214 have representation of some features. The two APs defined their own but kept in synchronization with each other on the common features. A "general" solution may depend on the results of the T12 Parametrics team. ISO 13584-24 has a parametric representation that may be useful for the representation of form features as well.

Cain said that not a lot of progress has been made in feature definition. Classification of features by name is a problem of disagreement and classification by grouping loses the meaning and there is probably not a lot of support for action. Rubber moulding has the same problem. The consensus is that the topic is still the subject of much complexity, disagreement and uncertainty and is not yet suitable for standardization.

**ISO 10303-223** The current status of this project is that progress to prepare the document for CD ballot is temporarily slowed down for lack of financial support. Radack reported the results of recent discussions with industry groups in the U.S.A. which showed that the greatest need is for the exchange of requirements between the customer and the foundry; with data exchange between the foundry and the die or mould maker the next priority. The groups he met with, representing mostly small foundries, were not interested in data exchange within the foundry, which they felt is currently managed satisfactorily by existing practices and systems. Data exchange within the foundry is currently a major section of the Part 223. Swindells reported that discussions with UK industries had shown the same needs. Radack felt that large corporations (large foundries or OEMs such as General Motors that have their own foundries) may have a greater interest. He will investigate this. Radack proposed a revised strategy for the development of the suite of APs for near net shape forming (223, 229, proposed powder products and proposed moulded plastic parts). The current structure is that each part deals vertically with its industry sector. However there are common requirements across all sectors. Radack therefore proposed a change to a series of Parts each providing models for data exchange across all four sectors. The first part would then be: "Casting part description" and include:

- shape representation
- materials characterization
- general tolerances and surface finish (ISO 1101, etc.)
- tolerances and surface finish specific to molded parts (ISO 10135, etc.)
- required physical and mechanical properties given by the customer for the cast parts
- changes proposed by the foundry

The other parts would be:

- Mould/die requirements
- QC/QA
- Process simulation
- Process plan (could link to Part 224)

The first priority to be the exchange of product requirements and the second for die design. This proposal was strongly supported by the meeting and possible strategies for achieving this change were discussed.

It was agreed that:

- the current version of Part 223 should be issued for CD ballot;
- members of T4 and T7/11 would solicit input from their countries as to whether the alternative structure and priorities outlined above should be adopted as part of the ballot cycle;
- WG3 could then approach SC4 with proposals for a change in scope in response to the ballot comments;
- the revised part could be developed faster with a reduced scope by using the new procedures based on modules and direct interpretation from the IGRs.

The problems which still have to be solved include:

- whether this procedure would require a New Work Item;
- what 'paperwork' and administrative steps would be required;
- where the resources would come from.

Dr. Radack handed out a new version of the Part 223 - N728 (both a full version and an abridged version without Clause 5 and the AIM annexes). It will be available shortly on SOLIS as PDF, Postscript and SGML files.

#### Presentation to Shipbuilding

The Materials Project Team made a presentation to the Shipbuilding Project on the resources available in the Part 45 for the representation of properties. The main objectives of the presentation were:

- to correct apparent misunderstandings about the purpose of Part 45
- to emphasize that the Part 45 provided resources for the representation of any product properties;
- that the ISO 10303 does not separate the concept of a 'material' from the concept of a 'product';
- to get the Group to include a module for properties within the Ship Building Core Model.

The presentation concluded with an example of a requirements scenario set by the certification agencies which demonstrated a need for the representation of complex properties and test methods which are much greater than are currently being considered by the Shipbuilding Group in their Core Model.

The response to the presentation appeared to be that the clarification of the purpose of the Part 45 was welcomed but that the current activities and resources of the group would not allow the development of any further extensions to the current scope of the Core Model.

Discussions outside the meeting however confirmed that there is a strong requirement for the representation of hydrodynamic properties resulting from tank testing and that the modelling of data environment in the Part 45 is consistent with the needs for the representation of the experimental conditions for these tests. There is also an acknowledged need to represent welding conditions but no discussions on these aspects have been held.

#### Presentation to ISO TC172/SC1

The Materials Project Team made a presentation on the Part 45 to the Group concerned with data representation and exchange for optical systems. The result was a better understanding of the purpose of the Part 45.

#### Review Progress and Set Agenda for Bad Aibling



The Materials Project Team achieved all of its goals during the meeting. The progress with the Materials Information NWI was disappointing but a set of positive actions to restore progress had been agreed. The revised strategy for the near net shape suite of APs was a promising way forward provided that funding could be obtained. The presentations to shipbuilding and optics were successful but further pressure on the shipbuilding group from the steel industry is needed and more resources for contributing to this group are required.

The provisional agenda for the next meeting at Bad Aibling. 7-12 June 1998, was agreed as:

Monday

pm Review progress since last meeting  
Approve agenda  
Review report of Orlando meeting  
Report on progress with actions from last meeting  
Resolve ballot issues with FDIS of Part 45

Tuesday

am Materials and properties in APs  
Review AP module experiment  
Develop proposals for new modules

pm New projects

Review proposals for NWI for Materials Information(MATINF)

Wednesday

Joint meetings  
Joint meeting with WG3/T9 for MATINF NWI

Thursday

am Joint meetings  
Joint meeting with WG3/T7 &11 on AP223, 229

pm Review progress and set new agenda  
Review progress  
Agenda and priorities for next meeting  
Close

Minutes Submitted by Norman Swindells

**WG3/T6: DRAUGHTING**

WG3/T6 did not meet.

**WG3/T7: MECHANICAL PRODUCT DEFINITION**

WG3/T7 minutes were not available at time of publication.

**WG3/T8: PRODUCT STRUCTURE & LIFE CYCLE SUPPORT**

**Attendance:** Available upon request

These are the combined minutes for the two projects within T8:

- AP 208 Project
- High-level Planning model for Product Lifecycle Support PWI Project.

### **WG3/T8**

#### **Monday, February 2, 1998 - Opening Plenary**

##### AP 208 status

Burkett reported that AP 208 is in Post-qualification review awaiting Q approval for release for CD ballot.

##### PWI Status

Dunford (PWI Project Leader) recounted the accomplishments of the project to inform newcomers on the project's progress. Most the presented material is contained in the final report of the PWI project. (Note: this report was later made "less final" and called an "Interim Report". Ed.) There are three tracks of work that the PWI is trying to initiate:

- Create development team
- Do the work - develop technical solution
- Manage standardization process

Crawford then presented the strawman plan for the organization that will develop the standards identified within the PWI's work. Crawford reported that no action has been taken with respect to selecting a host organization for the project because no business plan is yet in place yet.

#### **Thursday, February 5, 1998 - Closing Plenary**

Amaral noted that the initiation of a new project within T8 has led to some confusion of the status of AP208, especially since there have been no meeting specifically devoted to that subject. He announced that members of the project will hold a meeting at the IPO meeting in Washington DC (April 28-30) with two objectives:

1. Meet with members of the AP 232 project to discuss overlap and participation.
2. Discuss and map AP 208 ARM elements to the high-level requirements spelled out in the PWI work.

He also noted the intent to hold an AP 208 project meeting in Bad Aibling to review this work.

### **AP 208 Project**

#### Project objectives for meeting

- Report on status of AP 208
- Plan project activities over next six months

#### **Monday, February 2, 1998**

A presentation on the status and an overview of AP 208 was made to project newcomers.

Given the status of AP 208 in Qualification, there was little AP 208 activity at this meeting. Most of the activities related to AP 208 are reported in the minutes of the plenary session, above.

### **High-Planning Model for Product Lifecycle Support PWI Project**

#### Project objectives for meeting

- Develop business plan for active standards-development organization
- Extend requirements statements

The project held an extended meeting on the Friday and Saturday prior to the start of the "official" SC4 conference.

#### **Friday, January 30, 1998**

Dunford opened the meeting by announcing that this was the last meeting of this group. The intent leaving Florence was to complete the project's work by the Orlando meeting and publish a final report. What needs to be accomplished in Orlando is to define what happens next, which is made up of three things:

- How to relate to ISO (i.e., how does the project's products/process relate to the work of SC4)
- How do we get the work done (i.e., what resources are available to produce the products.)
- What work to do and in what order (i.e., what products to produce and when)

Objectives of the week are to clear/approve the final report and Florence minutes.

#### Darmstadt meeting

There is a working agreement between PDES, Inc., ProSTEP and JSTEP to develop a commercially-driven PDM standard based on APs and including modularization activities. This is not an ISO standards activities, even though it is a standards activity. The purpose of this meeting was to exchange ideas between the team doing this work and the PLCS planning work being done in the PWI.

#### NATO CALS Data Model (MCDM)

Dunford presented the status of the NCDM. DASA (German aerospace consortium) has done a "rig test" based on the NCDM; the test was very successful in showing power of integrated data. This effort continue through the end of March; there is a question about is where to go at that point.

#### US DoD CALS Office activities

LeClair explained that he was tasked by the Configuration Management Advisory Group (CMAG) of the US CALS DoD Office to review STEP and assess correspondence of the standard to MIL-STD-2549. It was this review that prompted his ballot comments on the second editions of parts 41, 43, and 44.

#### Issues

The team then reviewed open issues. Action was taken on a few issues; issues on which no action could be taken were re-affirmed as important and left open.

#### Review of Core Requirements document

Dunford then led a review of requirements contained in the report on "Core Requirements". This included requirements for identification, product structure and configuration management, and effectivity. Requirements for effectivity noted a distinction between including effectivity at rules/procedures external to the EXPRESS schema or explicitly encoded as part of the schema. There was a long discussion that addressed whether effectivity constraints should be incorporated into the data model or into usage rules that are specified externally to the model.

#### **Saturday, January 31, 1998**

Crawford led the discussion and development of the business plan. The plan is for the formation of an organization that will actually develop the standards identified in this project. He noted that there was definite interest from some vendors and industrial sponsors. The search is still open for "administrative home" or host organization for the work. Requirements for the host include

- international capability
- existing organization
- infrastructure and legal routes already in place.

The cost of participation in the organization was discussed. Besides nominal membership fee, members would be expected to contribute manpower to the project. Different kinds of contributions are possible, such as cash-in-kind, different roles of participation. There was a desire to keep it simple.

The time-scale over which the work will be performed was discussed; there was a concern over standardization time-scale versus ability to produce a product. A three-year product development period seems to be a good time-frame from a sales perspective. But the product development time-scale is a different thing than the ISO standardization process, which is a separate work item on a different time-scale, which can take as long as five years.

Points that were agreed upon by the team concerning the organization:

- It is a "project" rather than a formal or legal "organization" (hence the need to a host organization);
- 3-year duration;
- two levels of involvement/participation;
- full time core team (project manager (PM), STEP expert, administrator) (funded through participants fees);
- Project team co-located, full-team membership distributed;
- Steering committee (SC) cover their own costs;
- Part of the project manager's role is to keep T8 project apprised of progress and solicit reviews;
- Bi-monthly two-week working schedule for distributed workforce; variable location;
- Late joiners don't pay a penalty - steering committee decides acceptance;
- PM and SC decide what skills are needed (money paid if not available).
- Need to explicitly include requirements for travel expenses.

No firm decision was made concerning external participation in the project, but it was reaffirmed that the development project would leverage as much expertise and support as was available, including the use of T8 as a review forum.

It is the intention of the project to present the final report to the SC4 meeting in Bad Aibling to close the PWI project. The report will include ideas for NWI's that will also be presented for approval in Bad Aibling; any proposed ballot resolutions should be submitted to SC4 secretariat by May along with report. Mark Pearson closed the meeting with an informal presentation of an evaluation performed by the UK MOD of STEP Application Protocols with respect to MOD requirements.

#### **Monday, February 2, 1998 - 1545-1700**

Following the T8 plenary, the PWI project met to continue discussion of the business plan. Jim Crawford led the discussion and noted that maybe our first customer is potential host organization because the requirements of that organization will affect the content of the business/membership plan.

#### **Business proposal outline**

1. Introduction
2. Problem statement: what problem are we solving
3. Expect benefits
4. Scope of project
5. Schedule/task
6. Organization/task (who/how, method of working, should address Intellectual Property Rights)
7. Deliverables
8. Resources
9. Business approach - how to we participate (options for participation)

Existing work was identified that would fit into the proposal given the above outline.

#### **Tuesday, February 3, 1998 - 1300-1700**

The team received a presentation on the shipbuilding team's "building block" approach for the development of ARMs from Jochen Haenisch. The building blocks are individual chunks of EXPRESS code that provide a specified functionality and are defined and managed as a unit. Dunford recommended that the building block be reviewed to see which are applicable to PLCS requirements. Where did the ship common model come from? How did it emerge? Zabi Bazari answered that it was the integration of NIDDESC and European efforts.

#### **Issue/Timescale**

Loek Smits led a discussion on the timing and duration of project tasks and milestones for the technical product of the project and what needs be done to get the project team in place.

In order to form the steering committee and get the project work underway:

- Letter of intent and response from member companies (by April or May?)
- Steering committee meets and
- Selects/endorse host organization

- Appoints project manager
- Establishes team

Projection of 8 months to 18 months long to develop an "ARM". What can we leverage of existing work? It was noted that leveraging existing work isn't likely to gain that much time savings - integration and consistency are a huge job in and of themselves.

Initial tasks for project:

- Business analysis and scope
- Establish technical strategy
- Select candidate topic technical focus/elements
- Review relevant existing work
- Allocating work to other projects

There was a discussion concerning the relationship between the project and T8. If there is no champion to follow the part through to IS, then the part won't make it. The project needs to devote time and effort to see that the products progress through the standardization process.

#### **Wednesday, February 4, 1998 - 1300-1700**

The draft business plan received a lot of feedback and comments yesterday; however, the progress on plan development was slow. Therefore, Crawford will take the input, create a draft plan outside the meeting, and then review that plan with the team.

Standardization approach: It is recognized that standardization is a means to the desired end of integrated data. A close relationship with T8 membership will be maintained to promote concurrence and buy-in of the work done in the project.

Several approaches for how to "go about" developing the standards were discussed.

- (1) Create a huge ARM representing whole scope subsetting for individual APs using AICs, modules, or building blocks.
- (2) Module honeycomb approach: Identify small modules and build upon these.
- (3) "In-between" approach based on rough planning model scope. Good idea of core - expand on requirements and lead to solution.

Burkett presented a hybrid solution based on concurrent progress of both the "core" models and the ARMs of the identified APs. This raised a question over what is meant by "core" concepts. Is the "core" composed of components that are re-used within an AP, or is the "core" a set of abstract concepts that are specialized within the APs that use them? The "core" seems to have elements of both. The former supports the notion of "modularity" under development by PDES, Inc. and ProSTEP; the latter supports the notion of specialized abstractions proposed in EPISTLE.

An Interim Report will be published before Bad Aibling; this report will summarize and documents the result of the high-level planning activities. The Final Report delivered by the project will also include:

- Fuller statement of requirement for core and APs
- Organizational and standardization plan - ISO process

A final work plan will be developed at/by Bad Aibling.

#### **Thursday, February 5, 1998 - 1300-1700**

##### **PDM Schema/Modularization presentation**

Following the brief T8 closing plenary, Jim Kindrick made a presentation on the PDM schema and modularization work being conducted between PDES, Inc. and ProSTEP. The effort is bottom-up exercise - the scope of the PDM schema is implied or derived from a recognized subset of requirement shared by several APs. It doesn't have a "scope" in the same sense that an AP has a scope. It is not, as some have said, a Product Data Manager AP. There will be a meeting at PDES, Inc. in two weeks to work on PDM Schema modularization according the modularization development guidelines.

##### **Return to PWI agenda**

Dunford led a discussion concerning how to complete the requirements for the cores and the APs in the AP content diagram. Requirements can be a combination of text, data planning models of a particular style, possible business process model. Crawford cited two reasons for documenting requirements: (1) measure of success and progress and (2) explanation of what we're addressing. Need to be sensitive that there are different kinds of requirements.

### Rough business plan review

Crawford presented some PowerPoint slides that he prepared to pitch the business plan to prospective members. Crawford will produce a more complete draft of the business plan by March 1<sup>st</sup>.

### Friday, February 06, 1998 - 0845-1000

#### Project Planning

#### Before Bad Aibling

- turn business plan into reality
- continue requirements development
- work with PDM and modular - monitor relevance of

Smits recommended that the team should prepare some input for the module workshop on Product Identification and relationship to organization. (WG3 scheduled a "topical" meeting for Tuesday morning in Bad Aibling to discuss the subject of "product identification").

#### At Bad Aibling

It was evident at this meeting that the quality of work and accomplishments at the Bad Aibling meeting will depend on (1) what happens between now and then and (2) how much/many concrete work items are completed by then - productive meetings require solid input to review.

Products that the PWI project can/should produce:

- Business plan - Crawford
- Requirements:
  - RE guidelines
  - Core
  - Support Engineering
  - CM/Change management
  - Inventory and Maintenance - preliminary stuff
- Position/relationship of AP 208 write the PWI objectives

#### Bad Aibling Agenda

- Status of technical development team - Crawford - Tuesday PM for all, Proj Mgr Brief

	Mon	Tu	W	Th	Fr
0800-1000	SC4 plenary	Prod ID Mod/ Interop	Liaison Plenary	AP 208	<ul style="list-style-type: none"><li>• T8 planning</li><li>• SC4 meeting?</li><li>• Closing plenary?</li></ul>
1030-1200	WG3 Plenary	Prod ID Mod/ Interop	open	AP 208	
1300-1500	T8 plenary	<ul style="list-style-type: none"><li>▪ CM joint meeting</li><li>▪ Business Plan/PM brief</li></ul>	<ul style="list-style-type: none"><li>▪ Kindrik - module update</li></ul>	CM/CI	
1530-1700	LSA	Business Plan/PM brief	Core	T8 close	
1700-1900	WG3 Plenary	Oompah	Keep free	WG3	

## **WG3/T9: FINITE ELEMENT ANALYSIS**

**Attendees:** George Siebes, Harry Frish, Tim Wise, Mike Hayford, King Yee, Wade Gibbs, Eric Lebegue, Rodney Driesbach, David Leal, Norman Swindells, Anna Moreno, Peter Wilson, Ray Gault, Keith Hunten

The ESA Thermal AP work (STEP/TAS) was reviewed. There was discussion of how to bring the ESA work into the EA Core Model development project. Eric Lebegue will report at the Bad Ebling meeting in June on a proposed approach. In addition some good JPL/Goddard/ESA contacts have now been established with mutual interest in taking forward the STEP/TAS work.

An AP209 DIS ARM walk-through was held. There were no issues with the ARM as it stands. There was a joint meeting with WG3/WG12/T1 Shape committee whose primary purpose was the review of a set of examples illustrating the use of Math Rep schema with EA Core Model.

A joint meeting was held with the WG3/T4 Materials committee where a review of the scope of the NWI for Material Information was held. The detailed paper of the Materials Information Module was found to be too complex for review by application experts, so it was agreed that the NWI summary would be augmented by the Application Activity Model and only that would be sent out for review. In addition in order to aid in the communication of the Material Information Module to application experts and implementors it was agreed that an ARM layer and a layer of specialization below for specific properties would be added.

There was agreement that Lockheed Martin and Boeing will provide names of Aerodynamic experts to NASA to initiate cooperation on a CFD addition to EA Core Model.

There was a successful attempt to begin taking modules of the EA Core Model and AP209 ARM to combine AP209 unstructured FEA with EACM fields and property assignments. Modularization experiments on AP209 and EA Core Model will be held over the next few months.

Project schedule changes for AP209 and Part 104 (FEA) include holding DIS ballot to at least mid 1998 because of AIC 507 and 509 not being yet at DIS. A Quality review of AP209 will be done electronically in the March time-frame

Minutes submitted by Keith Hunten

### **WG3/T11: MANUFACTURING TECHNOLOGY**

WG3/T11 minutes were not available at time of publication.

### **WG3/T12: ARCHITECTURE, ENGINEERING, AND CONSTRUCTION**

WG3/T12 minutes were not available at time of publication.

### **WG3/T13: KINEMATICS**

WG3/T13 did not meet.

### **WG3/T14: PRODUCT DOCUMENTATION**

WG3/T14 did not meet

## **WG3/T17: PRODUCT FUNCTIONALITY**

WG3/T17 did not meet

## **WG3/T18: SHEET METAL**

WG3/T18 did not meet

## **WG3/T19: AUTOMOTIVE**

### **Summary**

Progress/accomplishments at Orlando meeting

work on AP214 CD2 ballot issues

(AIM / AP interoperability related issues)

WG12: NWI/CD ballot comment classification for 41.2, 43.2, 44.2 (preliminary)

? preparation of WG12 workshop in March,

? no change of upward compatibility policy !

WG12: AIC coordination, scheduling

? currently 15 AICs used by AP214,

at least 1 (509) to be scoped out for DIS

Project schedule changes

AP 214: currently no scheduling changes,

DIS document planned for 09/98,

final Qualification signoff in Beijing 10/98,

DIS ballot start expected for 11/98

schedule heavily dependent on progress of New Editions of Parts 41, 43, 44

? DIS needed by mid of 1998

Goals/issues/tasks before Bad Aibling

complete resolution of AP214 CD2 ballot issues: March 16-18, at AIAG, Detroit

mapping of revised ARM, AP214 IR issues: March 19-20, at AIAG, Detroit

WG12 Part 41, 43, & 44 ballot res. workshop: March 23-27, at SCRA, Charleston

AP214 DIS ,internal Qualification' planned: for ARM: 06-07/98, for Mapping/AIM: 08-09/98

Goals/issues/tasks by team at Bad Aibling

status, continuation of AP214 DIS preparation,

planning of internal Qualification

WG12: New Editions IRs , AICs scheduling, planning

WG3: experiment for ,Open Technical Forum' on PDM\_schema topics

### **Minutes**

Monday, February 02, afternoon (1:00 - 5:00 pm)

WG3/T19 meeting on AP214 Project Status:

AP 214 project status:

overview over recent ARM changes in CD2 ballot issue resolution process

discussion of remaining open Mapping/ AIM/ AP interoperability related CD2 issues

### **General remarks**

An internal qualification of the AP214 ARM will be conducted in June and July, the commitment of users is required until mid of March at the workshop at AIAG for further planning. The internal qualification of the AP214 Mapping Tables and AIM will be conducted in a similar way in July and August, 1998.

The DIS ballot is planned for November 1998.

The following countries with AP214 development background will provide technical experts for the new editions of parts 41, 43, and 44 as well:

France;

Germany;

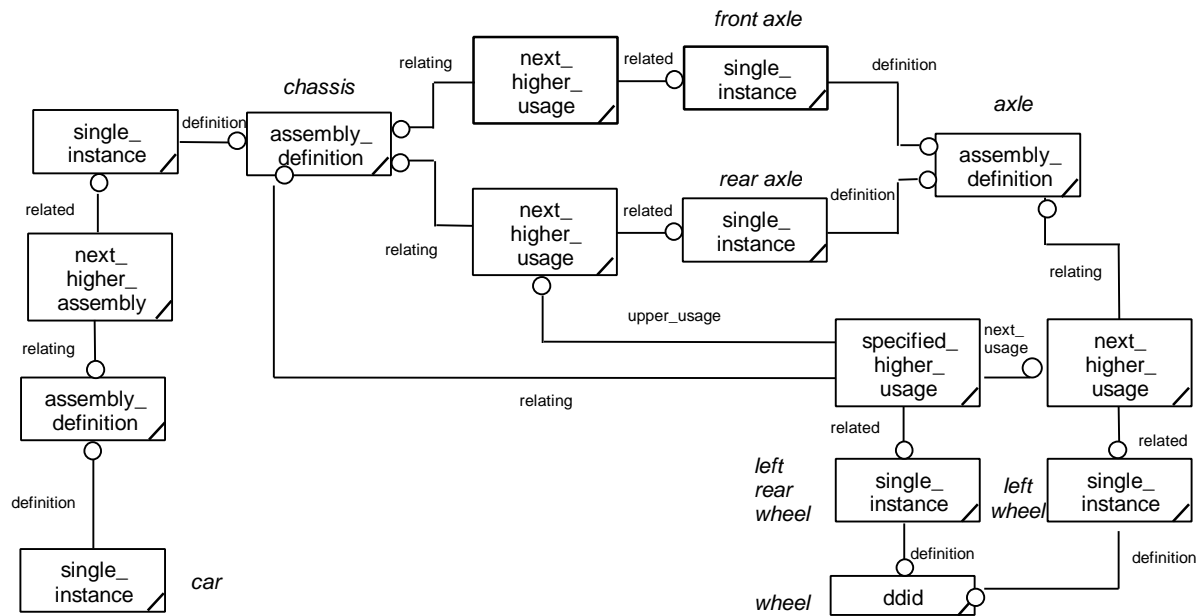


Japan;  
Norway (part 44 only);  
Sweden;  
United Kingdom (part 43 only);  
United States of America.

Until the end of February feedback from all user groups is required on the matrices regarding the new product structure model. Voting options are “required (yes)”, “rejected (no)”, and “don’t care” for all individual entries. A real world example is required for each entry that is voted to be required.

## ARM changes

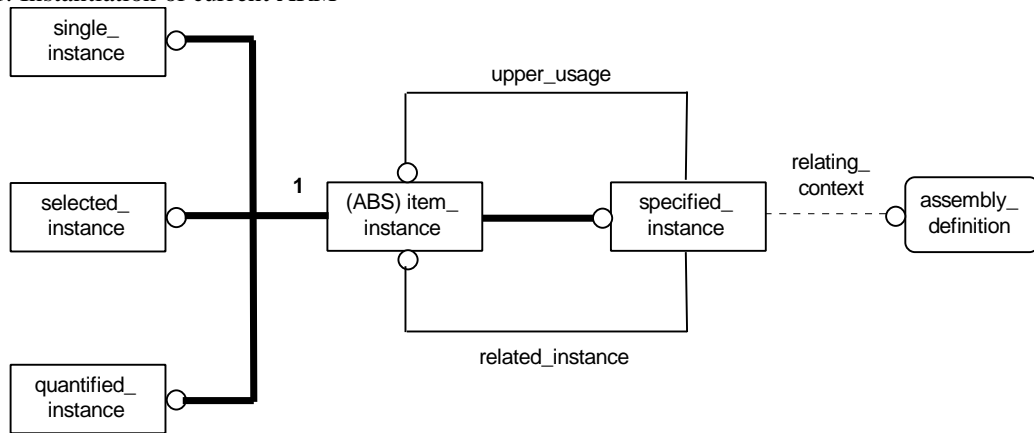
Page	Changes
G7	The application object solution_relationship will be renamed to alternative_solution_relationship.
G50-60	Explode the item_relationship_select.
G50-G60	Sort all page references in diagrams starting with G50 in alphabetical order.
Page	Changes
G5	Remove item_relationship_select from item_information_select. This is not an interoperability issue, because item_instance maps to an OR case of product_definition and product_definition_relationship.
G13	Specified_higher_usage: It was discussed, how to facilitate the specified_higher_usage in the ARM. Two proposals were made: Add subtype specified_instance to item_instance. See figures 2 and 3 for explanation. Use general_item_instance_relationship instead, see figure 4 for instantiation and values for general_item_instance_relationship. relation_type. In both cases the application object specified_higher_usage as is would be removed from the ARM. Final discussion is scheduled for the workshop in Detroit.
G12	Attribute effectivity context is removed from application object effectivity.



S\_MP\_00010-1

**On specified higher usage: instantiation of current ARM**

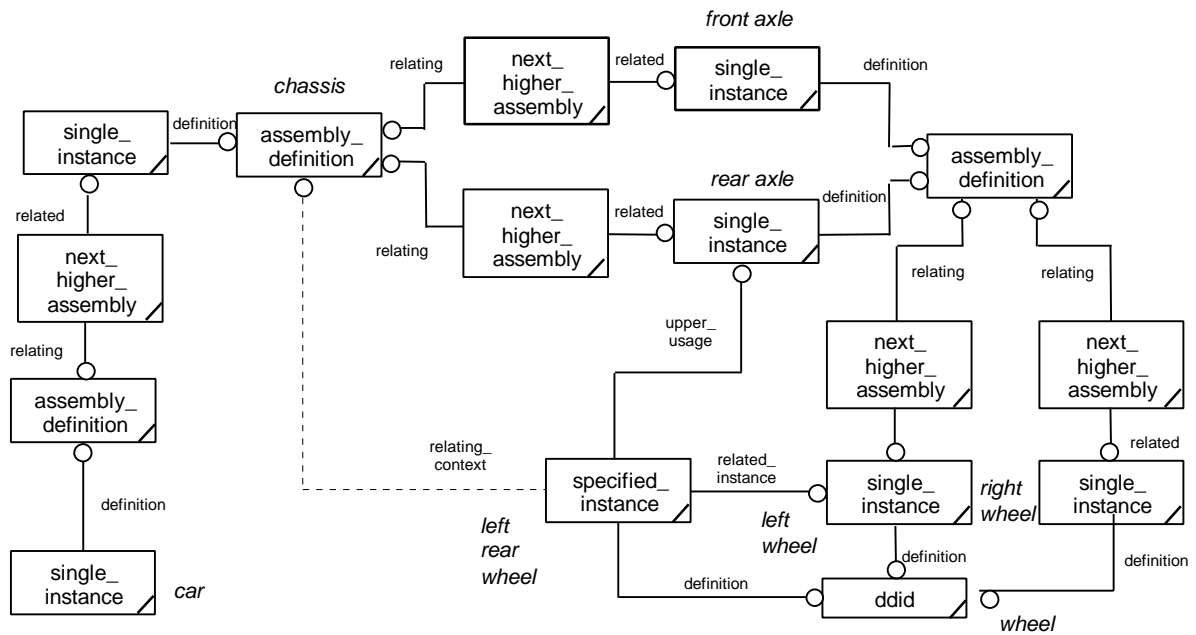
figure 1: Instantiation of current ARM



S\_MP\_00010-1

### On specified\_higher\_usage: ARM proposal

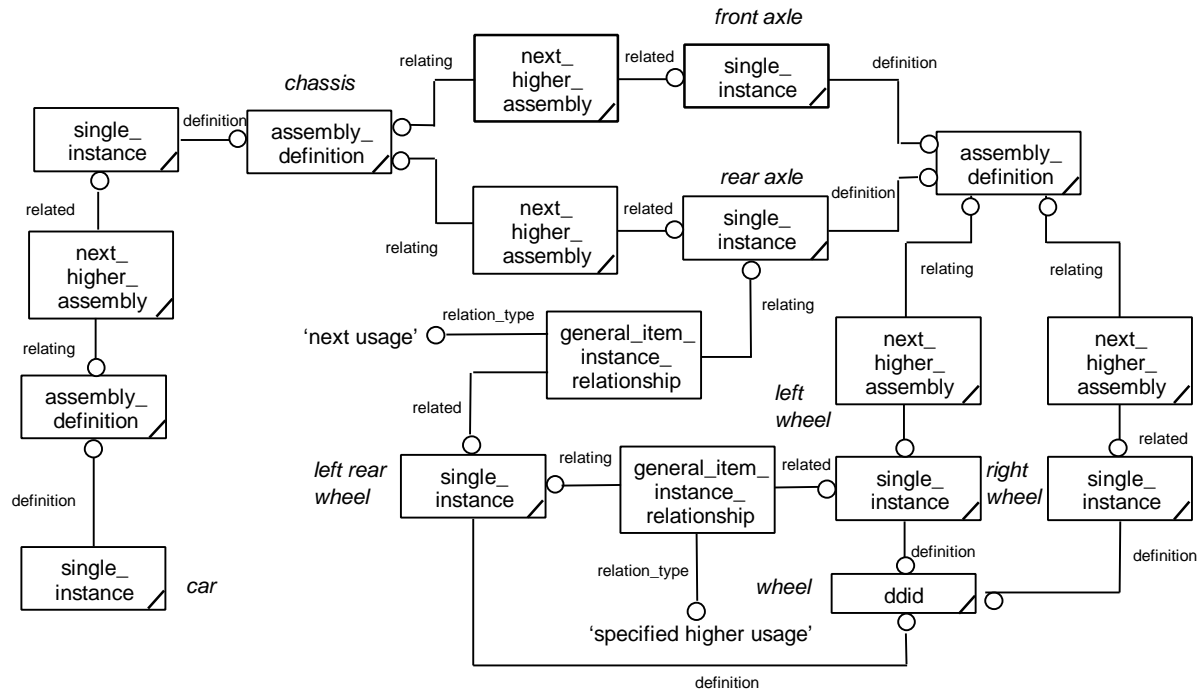
figure 2: ARM proposal for remodeled approach



S\_MP\_00010-1

### On specified\_higher\_usage: instantiation of ARM proposal

figure 3: Instantiation of ARM proposal



S\_MP\_00010-1

### On specified\_higher\_usage: alternative solution

figure 4: alternative solution to remodeling

Tuesday, February 03, morning (8:00 am - noon)

Joint meeting with WG12:

Part 41 NWI/CD ballot comments review and discussion

Part 44 NWI/CD ballot comments review and discussion (in parallel)

afternoon (1:00 - 3:00 pm)

Part 43 NWI/CD ballot comments review and discussion

Part 41 + WG3/T14 joint meeting on 'encoded data' issue (in parallel)

afternoon (3:30 – 5:00 pm)

Part 41, 43, and 44 NWI/CD joint ballot comments review and discussion

The issues on the NWI/CD ballot of Parts 41, 43, and 44 as brought to Orlando have been reviewed and classified:

- Part 41: 232 comments,
- Part 43: 20-25 comments (some editorial),
- Part 44: totally around 125-150 comments expected (more than 50% editorial)

IR Issues

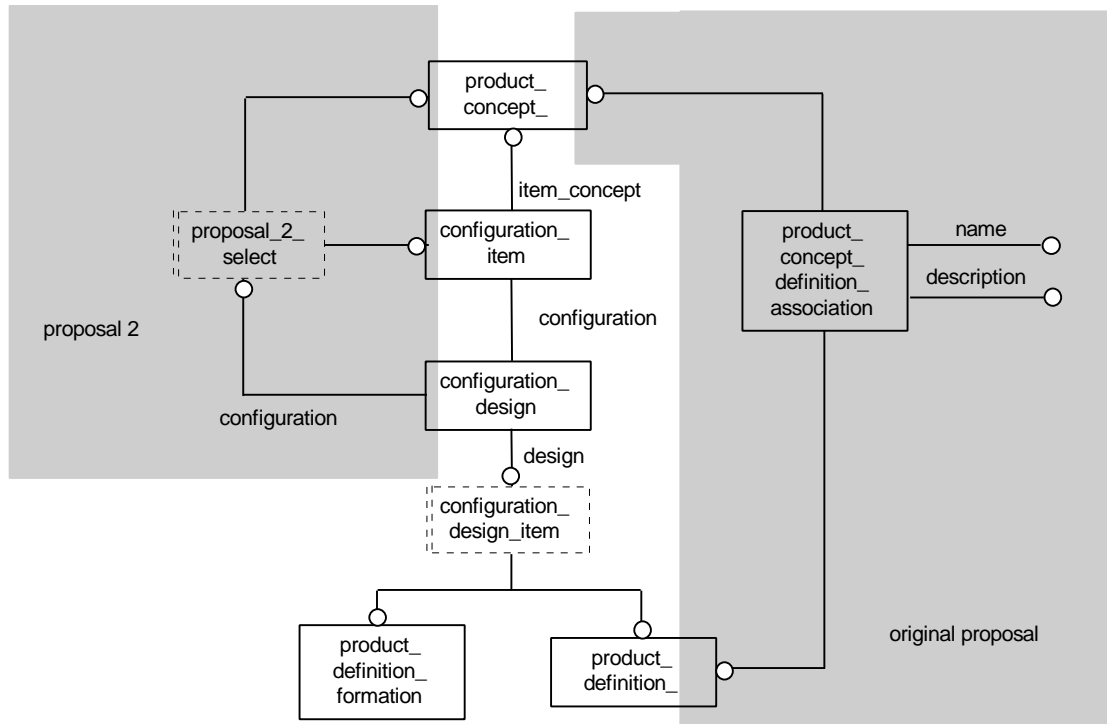
Part 44

Issue GER-44-7 was discussed with Mitch Gilbert and three options were identified:

original issue (see figure 5);

alternative proposal (see figure 5);

use different mapping: map application object `product_class` in the context of a `complex_product` like a `product_specification` with (at least) zero specifications. This enforces the presence of an instance of `configuration_item` for every instance of `product_class`.



S\_MP\_00010-1

## Issue GER-44-7

figure 5: issue GER-44-7

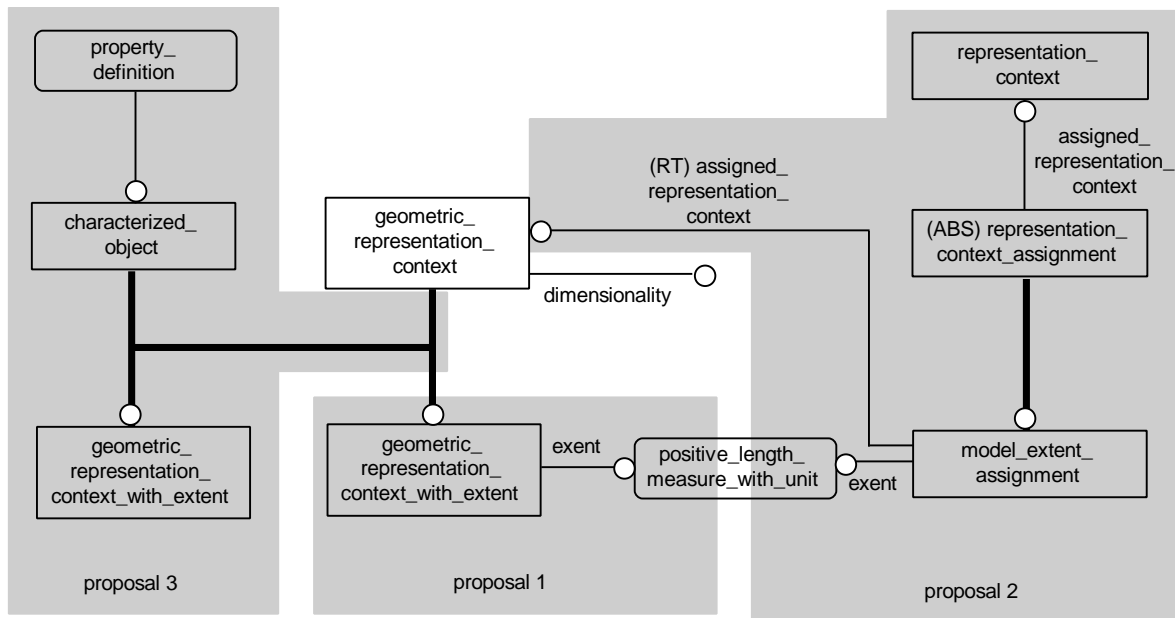
Part 43

Issue GER-43-6 was discussed with Julian Fowler. The intention of the issue is to assign a model extent to instances of `geometric_representation_context`. The issue was raised at the CAD round table, because a model extent is required by CAD systems to adjust the significant digits within calculation algorithms. Three options were discussed, see figure 6.

proposal 1 is actually within the context of part 42, but the issue was raised against part 43 due to the timing requirements of AP214;

proposal 2 would introduce a more generic concept in part 43, which is closely related to the management resources in part 41;

proposal 3 would not require any changes to part 43, but the correctness of the semantics have to be investigated further at the Charleston workshop.



S\_MP\_00010-1

## Issue GER-43-6

figure 6: issue GER-43-6

### Part 41

In the joint meeting with WG3/T14 the issue on Part 41 on 'encoded data' or SGML-string capabilities was discussed. The issue was targeted against the newly introduced `multi_language_attribute_assignment` in Part 41. After some WG3/T14 internal discussions it was decided to keep to that principle capability, but require a generalization of the approach. The introduction of a general 'encoded data' capability, including SGML or XML encoded strings has to be worked out further and will be introduced later, if required.

This problems with the current approach of `multi_language_attribute_assignment` were identified as follows:

- the assignment of a language and an alternate attribute value are two distinct capabilities that shall be separated and not combined in one assignment, e.g. with the current approach the assignment of just the language to an existing attribute value is not possible;

- the assignment of an alternate attribute value in another language is just a special case of the general alternate attribute value assignment capability, e.g. to make a distinction of different user skills for some description attributes.

This discussion led to an alternative proposal with a generalization of the `multi_language_attribute_assignment`:

Split into two assignments, one for the language and one for the attribute value, generalize the approach to include general attribute characteristics, e.g. skill, instead of just language:

```
ENTITY attribute_value_assignment ABSTRACT SUPERTYPE;
```

```
  attribute_name: label;
```

```
  attribute_value: attribute_type; -- SELECT of text, label
```

```
  role: attribute_value_role;
```

```
END_ENTITY;
```

```
ENTITY attribute_characteristic_assignment
```

```
  ABSTRACT SUPERTYPE;
```

```
  attribute_name: label;
```

```
characteristic_value: label;
role: attribute_characteristic_role;
END_ENTITY;
```

```
ENTITY attribute_value/characteristic_role;
name: label;
description: OPTIONAL text;
END_ENTITY;
```

An alternative proposal would combine the two assignments, which are both to an entities' attribute and not to a complete entity and tries to avoid the additional overhead of multiple assignments of the alternate\_value and the language in case of the mult-language case by the possibility of combining both assignments:

```
ENTITY attribute_assignment ABSTRACT SUPERTYPE OF
(ONEOF(attribute_value_assignment,
attribute_characteristic_assignment));
attribute_name: label;
role: attribute_role;
END_ENTITY; -- both attribute_name and role are now
-- inherited from the supertype
-- in comparison to alternative 1.
```

```
ENTITY attribute_value_with_characteristic_assignment
ABSTRACT SUPERTYPE
SUPTYPE OF (attribute_value_assignment,
attribute_characteristic_assignment);
END_ENTITY;
```

Friday, February 06,  
morning (08:00 am - 10:00 pm), afternoon (01:00 pm - 05:00 pm)  
WG3/T19 meeting on AP214 CD2 ballot issues:  
open issues from the issue resolution workshop on December 2-4, 1997  
status of Mapping / AIM / AP interoperability related issues  
discussion and possible issue resolutions  
Minutes prepared by Martin Philipp and amended by Juergen Mohrmann  
1998-05-20

## WG3/T20: PROCESS PLANT

**Attendees (one or more days):** David Adam, Brown & Root; Guy Pierra, LISI/ENSMA; Theo Arntz, Akzo Nobel Eng. b.v; Andries van Renssen, Shell International Oil Products; Ian Bailey, EuroSTEP Limited; Daniel Rivers-Moore, RivCom; Graham Bird, AIGIS Systems, Inc.; Jay Roberts, Jacobus Technology, Inc.; Pepi Edlinger, Bechtel Corporation; Nils Sandsmark, POSC/CAESAR Project; Robert Fisher, Intergraph Ltd.; Bruno Schilli, ABB Corporate Research; Mitch Gilbert, P.D.I.T., Inc.; Nikolay Shulga, Bentley Systems, Inc.; Steve Kline, NIST; Jan Sullivan, POSC/CAESAR Project; Ilse van Koetsveld, CIM Architects Delft b.v.; Thomas Teague, Exxon Production Research Co.; David Leal, CAESAR Systems; Hans Teijgeler, Fluor Daniel b.v.; Stuart Lord, ICI Engineering; Tetsuya Wada, Japan Energy Corporation; Ming Lu, AIGIS Systems, Inc.; Matthew West, Shell Services International; Earl Montgomery, Fluor-Daniel; Dave Witherell, Union Carbide Corporation, Reinhard Nerke, Siemens AG; En Sup Yoon, Seoul National University; Yoshimi Oota, Hitachi Limited; Junfeng Zhan, CSICCI; Mark Palmer, NIST

#### Status Reports on Process Plant AP Projects and Ballots

- AP 221  
The CD ballot closed 1997-11-17. A total of 477 issues were raised. No votes were received from three countries: France, UK, and USA. Per agreement with the SC4 chair, the project can proceed to DIS pending resolution of the issues raised. Theo Arntz gave a brief summary of the issues. A Web site is available with issues and draft resolutions at [www.fluordaniel.nl/iso10303.nsf](http://www.fluordaniel.nl/iso10303.nsf) (Lotus Notes developed file). The current project plan is to deliver the DIS version of the AP by the end of 1998.
- AP 227  
The AP 227 DIS ballot closed 1998-02-04. A comment resolution workshop will be held at NIST in Gaithersburg, Maryland on 1998-03-16 to 1998-03-19. A PlantSTEP implementers forum will be held in conjunction with this workshop.
- AP 231  
The project team is currently completing the CD version of the AP which is scheduled to be put out for ballot by the end of April, 1998. Current work includes finishing the mapping tables and the internal qualification of document by the project team in an effort to minimize the need for QC review prior to CD ballot. The plan is to finish the internal team review by the end of 1998-03.

#### Status Report on PIEBASE Activity Model

Mark Palmer gave a brief overview of the PIEBASE activity model and a summary of recent work on the model. A revised version of the activity model was sent out to the PIEBASE executive committee for review on 1997-09. Very few comments to the model were received. The team still needs input to improve the fabrication, commissioning, and operations areas of the model and is investigating the use of some form of browser to make it easier to review the model on the Internet. The next version of the activity model is scheduled to be put out in 1998-07.

**Action Item** - Andries van Renssen will provide input for the description of fabrication. Andries to send input to Mark Palmer.

**Action Item** - Steve Kline to send to Matthew West, David Adam, Andries van Renssen, Hans Teijgeler, Bruno Schilli, Ilse van Koetsveld, and Nils Sandmark a copy of the activity model by 1998-03-06.

#### Reports and Issues from Industry Programs

- PCALS  
Yoshimi Oota gave a presentation of a partial ARM-AIM mapping of AP 227 using EXPRESS-X with EXPRESS versions of ARM and AIM was done. PCALS is also mapping certain AP 225 elements to AP 227, but are not doing a corresponding mapping from AP 227 to AP 225. Implementation of AP 227 was demonstrated at the CALS Expo in Japan in 1997-11. An observation based on the development work was that EXPRESS-X needs major changes to improve compilation speed for use in real-world implementations. The AIM to ARM conversion really took a long time to compile. A work-around of creating a data dictionary version of the AIM first improved the AIM to ARM conversion time.

Hitachi and Bechtel are using AP 227 in a test exchange of power plant designs. They have had partial success in passing piping information. Issues resulting from this test have been added to the AP 227 Implementers Forum email exploder. Development was done using STEPTools, Inc. products.

- AP 221 Class Library with AP 202 Symbol Library

Ilse van Koetsveld explained the work done combine an AP 202 symbol library with an AP 221 Civil class library.

- **STEP Implementers Forum**

A concern was raised regarding the representation of process plant requirements at the STEP Implementers Forum (SIF) meeting which was scheduled for 1998-02-04 at the ISO conference. Do we want to broaden the discussion to take place on Wednesday to make sure it addresses process plant? The Forum has only discussed Mechanical CAD issues previously. The implementation taking place within STEP is not just mechanical piece parts. The impression people have is that the Implementers Forum covers more than it really does. Do we need a separate Implementers Forum for process plant? It was decided to add discussions on implementation issues and results during the Monday afternoon process plant AP planning project meeting. The process plant group will work to ensure that relevant issues arising from our Monday afternoon discussions will be conveyed and discussed with the STEP Implementers Forum.

**Action Item** - David Adam - Participate in the STEP Implementers Forum meeting and provide a summary of the meeting. (Done) This summary is provided below.

David Adam gave a presentation on the activities of EPISTLE to the SIF. This included the activities of both the EPISTLE Implementors group as well as the Industrial user group.

It was evident in the discussion that followed that there was little knowledge of the existence of the EPISTLE groups, let alone what they were doing. The SIF was dealing with mainly AP 203 and much of the discussion was about geometric tolerances. Due to the level of maturity of that AP, the group had established a sound procedure for dealing with issues from trying to use the AP for exchange. It is evident that a similar process should be set associated with the implementation of AP 221.

**Action Item** - David Adam - Take the issue of establishing procedures for dealing with implementation issues back the original members of the EPISTLE implementation group and also discuss this concern with the AP 221 team.

The SIF requested that at the next ISO meeting, a presentation be given on the EPISTLE framework, as well as giving more details of the learning processes that have taken place during implementations.

**Action Item** - David Adam - Discuss providing a presentation of the EPISTLE framework at the next ISO meeting with the appropriate EPISTLE groups.

It was agreed that the cross-fertilization of knowledge among the STEP implementation groups, e.g., SIF, EPISTLE, PlantSTEP, would be of benefit in not just sharing technical knowledge, but also sharing the methods of approach.

#### Proposals for New Work

- **Operations NWI**

Tetsuya Wada and Graham Bird gave an overview of the Operations NWI proposal. The Operations NWI was discussed in more detail at the Tuesday afternoon meeting. This NWI is being sponsored by Japan Energy Corporation (JEC). This NWI might be an opportunity for synergy with the NWI proposal from the shipbuilding folks to cover the monitoring of the operational performance of ships. There is probably a core set of information that is applicable to both of these NWIs proposals.



- Other Issues

Mitch Gilbert raised concerns about the current revisions to the IRs that are out for ballot. Mitch recommended that the process plant group should consider creating a set of resources for the process plant arena that address those areas that have not been included in the current version of the IRs that are going out for ballot. This group needs to understand the ramifications of the problems the current IRs have. Currently proposed version of Part 41 does not meet the needs of APs 221 and 231. Part 41 has restrictions that impede things we want to do in the process plant area. Some of the proposals that process plant has made have been rejected or have been implemented with inefficient structures. Process plant teams and their sponsors should convey these concerns for inclusion with their country's votes and comments on the revised IRs. Time frame for doing this could be a problem given the current state of the process plant APs.

AP Harmonization for Plant Engineering and Operation - Handout provided

Bruno Schilli covered the results and inputs received since the 1997-10 ISO meeting and reviewed the status of a proposed procedure and points of contacts for various APs. Comments on key concepts defined in the 1997-10 ISO meeting were received from Andries van Renssen. These comments broke the concepts into associations between objects (grammar), fundamental types of objects or things (basis for instances), and classes of objects (dictionary). Reinhard Nerke commented that the table of concepts is too detailed for starting work. He proposed reducing the number of concepts we need to look at by using a planning model of each AP to look for the groups of concepts to consider rather than the detailed concepts. Mark Palmer commented that we need to get agreement on the high priority concepts for harmonization and the commitment of assigned resources to the harmonization task during the next six months. Hans Teijgeler commented that we should harmonize the APs on the UoF level first because it is too early for the level of detail in the key concepts. Mitch Gilbert commented that there are certain decisions made during interpretation (e.g., classification) would not be addressed by just looking at the UoFs alone.

- AP 210 to AP 212/AP 214 Example

Reinhard Nerke presented a summary of work that was done using APs 210, 212, and 214. His example looked at APs 210 and 212 and involved the association of functional and physical objects. This led to a mapping of the connectivity and hierarchy between APs 210 and AP 212. Questions addressed and lessons learned from this exercise were: What are the relevant partners to harmonize with and what are the highest priority? What are the most urgent information we need to get? Need to develop a road map of what's in the AP and also what's out there that may be related. Determine what are the relevant ARM entities. Identify the appropriate counterparts in the peer APs. Harmonize where possible or specify mappings between related counterparts. There needs to be a face-to-face discussion between members of the AP teams in order to understand how each team used or defined the concepts that are being harmonized. Early-on collaboration and cooperation between related APs helps to minimize the differences that need to be harmonized on common concepts. APs are domain specific which may preclude an exact 1 to 1 mapping. One AP may go into much more detail than another on a concept to deal with their specific view(s).

**Issue** - Where will the results of a harmonization effort be documented? In a separate technical report? In an informative annex of the AP?

**Action Item** - Reinhard Nerke - Send to Mark Palmer documentation of the work done on harmonizing APs 210, 212, and 214 and an electronic copy of the slides used in his presentation for distribution to other meeting attendees.

**7:00 p.m. - 9:30 p.m.      PIEBASE activity model - PIEBASE Working Group 2 (PWG2)**

## Agenda

1. Delivery to industry
2. Confirmation of intended business value and uses
3. Executive summary and diagrams
4. Web-based distribution
5. Voids in model

### Delivery to Industry

Mark Palmer indicated that the next release of the PIEBASE activity model is scheduled for 1998-07. This next release will include alignments with the AAMs in the new versions of APs 221, 227, and 231.

### Confirmation of Intended Business Value and Uses

Mark Palmer discussed the documented set of business drivers for developing this activity model and asked the meeting participants to come up with any additional drivers by asking the following questions: Do we see that there is business value in further developing this activity model? Are there other business values that were not covered? What is the competitive advantage gained by using this activity model? Inversely, if you don't use the model, are you then at a competitive disadvantage? Additional benefits of the activity model that were identified are:

1. To provide a common language and framework for:
  - a. mapping/comparing activities among organizations/parts of organizations
  - b. studying interfaces between organizations (model is organizationally independent)
  - c. guiding enterprise re-engineering
  - d. optimizing the business and work processes
  - e. identifying overlaps and voids in the use of software tools used to support business activities
  - f. providing a checklist of activities and information flows (for data and data exchange) that need to be assigned to someone in order to complete a task
2. Activity-based costing analyses can be done with it.
3. Supports the globalization and outsourcing of enterprise activities

**Action Item** - Mark Palmer - Take the above benefits and work with Stuart Lord to revise the PIEBASE model executive summary to include them. Stuart Lord to provide revised executive summary to Mark Palmer by 1998-03-06.

**Action Item** - Daniel Rivers-Moore - Provide to Mark Palmer and Stuart Lord the proposed graphics described below so that he can update the executive summary by the end of the week. (Done)

### Executive Summary and Diagrams

Daniel Rivers-Moore reviewed the recent iterations for diagrams used in the executive summary.

**Issue** - An issue against the PIEBASE activity model was that more specific labels on the 'Report' data flows shown as outputs from the 'Manage ...' activities need to be provided.

**Action Item** - Mark Palmer - Add to the executive summary a section that describes which of the PIEBASE model activities the existing APs are addressing and where the AP AAMs overlap.

**Action Item** - Mark Palmer - Add a discussion of the reason for not decomposing Produce Product activity (A34) further.

**Action Item** - Steve Kline - Add the number of levels of decomposition provided in the PIEBASE model to the summary slide used in the PIEBASE executive summary. (Done)

Ming Lu identified other technical values of the PIEBASE activity model. These are:

1. For organizing and configuring resources (people, software, etc.)
2. To identify or classify the data so that the data modeling can meet the activity requirements

#### Web-based Distribution

RivCom sent out an initial sample of how this might be done. The PIEBASE executive committee reviewed the sample and decided not to assign funds for Web-based distribution at this time. This decision will be reviewed at a subsequent meeting.

#### Voids in Model

**Action Item** - Hans Teijgeler will investigate providing some material for maintenance. Andries van Renssen possibly could provide some input on operations and maintenance to Hans. Operations NWI team could provide some input.

**Action Item** - Ming Lu and Hans Teijgeler will work on the operations and maintenance modelling and send a status report to Mark Palmer by 1998-04-15. By 1998-03-15 Graham Bird and Andries van Renssen will let Mark Palmer know what they can provide to Hans Teijgeler as input.

**Action Item** - Steve Kline - Change the title of activity A1 to 'Manage the Business' instead of 'Manage Core Business'. (Done)

**Tuesday, 1998-02-03**

**1:00 p.m. - 5:00 p.m.      Discussion of AP 227 DIS ballot comments  
Operations AP NWI proposal**

#### Discussion of AP 227 DIS Ballot Comments

- U.K.

The U.K. review was performed by three people. They primarily looked at the DIS version of the AP to determine whether CD version issues had been adequately addressed and whether interoperability concerns with AP 221 had been adequately addressed. The AP 221 team will participate in resolving interoperability issues between APs 221 and 227. A summary of the U.K. issues is provided below.

1. Utility of AP - Don't see many business scenarios needing a full exchange of a 3D model. More useful scenarios would be incremental updates of the model and sending a model to a data warehouse where the data from the model is put into the data warehouse.
2. Change management was not adequately addressed.
3. Interoperability concerns
  - a. Product definition subtyping.
  - b. Identifier issues.
4. Classification gets done in two different ways.
5. Weight and mass appear to be used as synonyms in some text.
6. Connections and connectivity - wide harmonization issue.

- Japan

A summary of the Japanese issues is provided below.

1. Need plant north.
  2. Based on the comparison from AP 225 to AP 227 - Component type decomposition is not as detailed in AP 227 for steelwork and HVAC - Should it be the same?
  3. Catalogue is a problem because of external\_reference concerns.
  4. Plant item (equipment) vs plant system. Would like to represent a plant item as a system also.
  5. Can't tell whether the coordinate system is left or right handed. Part 42 is right-handed. This is not described in AP 227. Need to add a constraint to require right-handed or the capability to define what you used.
  6. Piping system and the support system for the piping needs a tighter relationship.
  7. Need a centerline capability for HVAC and electrical runs.
  8. Piping system components don't appear to have physical properties.
  9. There seems to be a one to one relationship between shape primitives and shape representation. This is incredibly inefficient. Need to look at the mapping.
  10. Translation between the ARM and AIM is inefficient. This is common to other parts of STEP.
- The Netherlands

A summary of the issues raised by The Netherlands is provided below.

1. Consistency between the Scope and the AAM is not good. Quality of the AAM needs to be improved. (This is being resolved through collaboration on the PIEBASE activity model.)
  2. Scope starts at conceptual engineering phase. Does 3D really start at conceptual engineering?
- U.S.

A summary of the issues raised by the U.S. is provided below.

1. Flagging portions of mapping reference path that need to be created versus those that come from somewhere else.
2. Useful distinction between product definition vs product.
3. Better description of the how to use the mapping tables for implementation needs to be provided.

#### Agenda for ISO Meeting in Germany

Monday, 1998-06-08

1:00 p.m. - 5:00 p.m.      Process Plant AP Planning Project

1. Status reports on Process Plant AP projects and ballots
  - AP 221, Functional Data and their Schematic Representation for Process Plant
  - AP 227, Plant Spatial Configuration
  - AP 231, Process Design and Process Specification of Major Equipment
2. Status report on PIEBASE activity model
3. Reports and issues from industry programs
4. Reports from Implementors Forums and implementation issues
5. Status of PLIB interface for process plant APs (West)
6. Status of OPC work (Lu)
7. Status of Operations AP NWI
8. Proposals for new work
9. AP harmonization for Plant Engineering and Operations (Schilli)
  - AP 212, AP 221, AP 225, AP 227, AP 230, AP 231
10. Summary of action items

11. Agenda and schedule for the next ISO meeting

7:00 p.m. - 9:00 p.m. AP harmonization for Plant Engineering and Operations

Tuesday, 1998-06-09

8:00 a.m. - 12:00 p.m. Meet with Oil and Gas Group

1:00 p.m. - 5:00 p.m. Walk-through of AP 231

Wednesday, 1998-06-10

10:30 a.m. - 12:00 p.m. Meet with Oil and Gas Group

1:00 p.m. - 5:00 p.m. Discussion of AP 221

Thursday, 1998-06-11

8:00 a.m. - 12:00 p.m. Discussion of AP 221

1:00 p.m. - 2:00 p.m. AEC Plenary

1:00 p.m. - 5:00 p.m. Discussion of AP 221

Friday, 1998-06-12

10:30 a.m. - 12:00 p.m. AP Harmonization for Plant Engineering and Operations

1:00 p.m. - 5:00 p.m. AP Harmonization for Plant Engineering and Operations

Operations AP NWI Proposal

Tetsuya Wada described the organizations involved in this NWI. His presentation slides will be available on the Web site. Graham Bird discussed the business case for the NWI. Ming Lu presented the technical aspects of the NWI. See the following Web sites for further information: [www.asi96.com](http://www.asi96.com) or [www.i-forum.com](http://www.i-forum.com) Comments/questions raised during the technical presentation are summarized below.

1. How are the process fluids described? Within the process database.
2. Need to address status and operation of equipment objects. Activity objects can be intentional or accidental.
3. Missing conditional dependencies.
4. Are properties time-dependent?
5. How are essential attributes defined? AP 221 has 50+ associations. NWI has 10 essential attributes. The remainder will be defined later.
6. What is the rationale between essential and additional attributes? They are context dependent.
7. Inherent is a better word to use than essential when discussing attributes.
8. How can you have a real-time database? By definition once you put the data into a database, it is no longer real-time.
9. Make sure you know what you want to end up with before you start the process of developing an AP. If you do not desire the interpreted model inherent in the AP process, then you may not want to use ISO 10303. The overlaps with ISO 15926 should be investigated.
10. SC4 does not address real-time communication requirements, e.g., those required for monitoring the operations of process plants.

**Wednesday, 1998-02-04**

**1:00 p.m. - 5:00 p.m. Discussion of AP 221 CD ballot comments**

P-LIB Interface

**Action Item** - The P-LIB interface structure requirements defined in Gunter Staub's document (Interpretation of P-LIB services, 1997-12-07) shall be incorporated into AP 221.

Regarding the use of P-LIB, Guy Pierra commented that the P-LIB standard should be used to hold the standard classes defined in AP 221. Matthew West indicated that P-LIB does not meet all the requirements for the storage of the AP 221 class library. Andries van Renssen stated that a major problem with P-LIB, is that it is not possible to define a property independent of a class of material. Guy stated that the French issues says that the standard classes in AP 221 are not defined sufficiently precisely. Andries van Renssen commented that the definitions in the CD draft are inadequate, and have been improved. This issue does not impact upon the data model used to store the class library. Guy stated that another French issue is that it is impossible to relate the standard classes in AP 221 to the application objects in AP 227. A subset of the AP 221 class library that overlaps with AP 227 is being developed, and could be expressed using P-LIB.

**Action Item** - The use of P-LIB for the definition of the standard classes that are common to AP 221 and AP 227 shall be investigated in detail by joint work between the AP 221 and P-LIB teams. This work shall also address relevant properties for each class. The scope of this work will also include the P&ID conformance class.

#### Web Access to AP 221 CD Comments

Hans Teijgeler demonstrated the Web software and site that will be used to manage the resolution of AP 221 issues, and that will enable the owner of an issue to track its progress. The Web site is <http://www.fluordaniel.nl/iso10303.nsf>.

#### Class Library Development

Andries provided a progress report on STEPlib and demonstrated the Web software used to manage the development of the class libraries. A Web site exists at [www.spi-nl.info.nl](http://www.spi-nl.info.nl) where the spreadsheets are for the various parts of STEPlib. The STEPlib team has currently accepted approximately 4900 classes and their definitions and have another 7600 under review.

Tom Teague indicated that there are a limited number of class\_of\_properties (equivalent to AP 231 attributes). More need to be added. Andries van Renssen responded that the hierarchy used causes some of the properties to be somewhere else than you might expect. Also, the AP 221 team has been concentrating on getting the hierarchy right. They are just now getting to the point where they can focus on determining what attributes are still needed and where is the appropriate place in the hierarchy to put them.

#### U.S. Comments on AP 221 CD

Mark Palmer provided a summary (A summary document from Mark was distributed.) of major U.S. issues. These are:

1. There is a need for a defined structure for identifying the source of symbol and font libraries, and for conventions used in a schematics.
2. There should be a conformance class that specifies a minimum useful subset necessary to exchange a useful P&ID.
3. A conformance class for a minimum data set for a data sheet should be investigated.
4. There is insufficient guidance on how to correctly specify connectors and their connectivity.
5. There is incomplete analysis and synthesis between different class libraries.
6. The AP 221 and AP 227 glossaries are not consistent.
7. The class libraries for instrumentation and control are inadequate.
8. There is inconsistency and ambiguity in the use of the facility and material concepts.
9. There is no match to the capability of current systems, so what proof of implementations will be available at the DIS level?

10. Only P&IDs are covered. Concerns were raised as the adequacy for other types of schematics.

At a meeting with the AP 221 team in Haarlem, The Netherlands, in 1998-01, it was agreed that:

1. A conformance class for P&IDs shall be added to AP 221.
2. The beginning of the document (up to an including clause 4) is difficult to understand and shall be improved.
3. The common AP 221/AP 227/AP 231 glossary shall be updated for use in future releases of the APs.

Summarized below are the major technical issues raised by the U.S. and any proposed resolution of them.

**Issue 031** - AP 221 team agreed with the issue and examples of items not listed. There is a need to reach an agreement on what level of detail is necessary since that level of detail is dependent on what we're trying to do. For example, if we are trying to cover what is required for a P&ID, then we have a good idea as to what level of detail is required. Fixing Annex L and use of the P&ID conformance class appears to be a viable path forward to resolving this issue.

A discussion related to Issue 031 was the translation of symbol information. There is an ISO standard for symbols; why not use it as our standard and translate back and forth from it? Andries van Renssen commented that what would be good is a Part 21 file for each symbol that can be attached to the class library and then used. There is also an ISA document for instrumentation symbols. Pepi Edlinger commented that we need to make sure that what we put in the standard does not limit our ability to take advantage of advances in technology in the future. For example, prescribing a specific set of symbology to use may limit us in the future. David Leal indicated that all that is required is a way of making a computer sensible reference to indicate that a symbol with a particular scaling, position and orientation is defined in the other standard. Bob Fisher stated that standardization of connect point layout is essential if different symbol libraries are to be interchangeable.

**Action Item** - Bob Fisher to provide a reference to the ISO standard for symbols by to the AP 221 team by 1998-03-06.

**Action Item** - Earl Montgomery to provide a reference to the ISA standard for instrumentation symbols to the AP 221 team.

**Issue 035** - The class libraries are based on several standards, but they are not copies of them since they do not conform to the approach used by AP 221. The standards listed in the comment (ISA-S20-1981 and ANSI/ISA-S51.1-1979 (revised 1993)) have been looked at in the current class libraries, but the class libraries may not totally contain the content of the ISA standard at this time. Andries van Renssen recommended that the people making the comment should participate in the class library peer group in order to ensure that the required information is included. A minimum set of attributes that are required in the class library needs to be agreed upon prior to taking AP 221 to DIS. This needs to be done by the October 1998 timeframe to support the AP 221 schedule. It is intended to bring the class library on as a registry, that will be maintained electronically and will be updated as needed. Use of SGML and STEP work may make the issue of presentation of the information being exchanged less problematic.

**Action Item** - Andries van Renssen and Earl Montgomery - Figure out what an appropriate path forward should be for Earl to carry to ISA. Carry back to ISA a recommendation that they participate in the peer group for instrumentation and controls? Provide a populated instrument data sheet with the data used to populate the spreadsheet for the ISA folks to use.

Pepi Edlinger commented that AP 221 only addresses information. It is also necessary to exchange the format of a data sheet, so that the engineer can find the information in a familiar place. Matthew West

stated that the format for the presentation of information is determined by an application and not by AP 221. AP 221 cannot do everything. Andries van Renssen commented that SGML may be a way to approach this when SGML and STEP are integrated. It was agreed that data sheet formats are not in the scope of AP 221.

#### **6:00 p.m. - 9:30 p.m. Process Plant AP Common Terms Glossary**

Representatives from APs 221, 227, and 231 met to discuss definition of a set of common process plant terms to be included in clause 3 of each of the process plant APs.

**Action Item** - Steve Kline - Draft text for clause 3 that explains why we have any differences in definitions between clauses 3 and 4.2 for AP 231.

**Action Item** - Steve Kline - What is the process for referencing definitions provided in other APs? Check with QC to see if 1) one process plant AP should define the common terms and subsequent APs should add a subclause in 3 to reference it or 2) should we just repeat the definitions for common terms in each AP's clause 3? Determine QC (Jesse Crusey) position by 1998-03-06.

Using the current version of the AP 231 clause 3, the meeting participants reviewed the terms and their definitions and provided recommended changes to the terms and definitions. These recommended changes are summarized below.

1. Actual - Make the 2<sup>nd</sup> sentence in the definition into a note. Is the use of 'descriptive adjective' strong enough in the first sentence? Look at changing 'item' to 'thing' to be consistent with other terms.
2. Assembly - Use as a common term.
3. Catalogue - Delete 'a collection of items or' from the first sentence.
4. Collection - Leave in the use of 'things' in the definition.
5. Component - Look at use of 'item' versus 'thing'. Isn't a component ALWAYS part of an another item?

**Action Item** - AP 231 Domain experts - What are they referring to when referring to a 'part of a process material that is a mixture'? Address this issue at the AP 231 team meeting on 1998-03.

6. Connection - The use of 'process material' versus 'material' was questioned. It was recommended that 'process' be deleted from 'process material'. The use of 'signal' versus 'information' was questioned. It was recommended that 'signal' be left in the definition.
7. Construction material - It was recommended that 'item' be used instead of 'plant item' and that a note be added that indicates that item refers to a plant item in the context of AP 231.
8. Design - Term is used in the context of information and also in the context of activity of design. It was recommended that the start of the definition be changed to 'a collection of information intended to used for the creation of a process plant, portion of a process plant, or item, that ...'.
9. Duty - The current definition is too restrictive to be used in AP 221. AP 227 does not need it. Should the definition cover all forms of energy or loads?

**Action Item** - AP 231 domain experts - Need to look at making the definition of duty more general. Address this issue at the AP 231 team meeting on 1998-03.

10. Equipment - Change the definition to 'an item or assembly of items that is designed to perform an operation and that may be treated as a single item for the purpose of design, acquisition, or operation.'
11. Equipment data sheet - Change the definition to 'a data sheet for equipment.'



12. Data sheet - Add this as a new term and define it as 'a document consisting of one or more pages presenting specification data relevant for the definition of one or more items in a stylized form'.
13. Function - Hans Teijgeler felt that we should add the term 'function' to the list of common terms. In the AP 221 class library, function is defined as 'to act in a required or expected manner'. It was recommended that the term 'function' be added to the list of common terms.

**Action Item** - AP 227 and AP 231 Teams - Look at the above definition of 'function' and provide comments to it.

14. Functional - Change the use of 'item' to 'thing', delete 'capabilities' and modify note to clarify that in the context of AP 231 a thing is a plant item that provides a functional capability. Use 'function' instead of 'purpose'.
15. Functional characteristics - AP 221 does not need it. Term is in 227 and 231. Agreed to NOT make it a common glossary term. Nomenclature and codes are not characteristics. A suggested definition was 'Those properties that describe the performance or behavior of a plant item.'
16. Functional requirements - See discussion for functional characteristics. Use 'requirements' instead of 'properties' in the definition.
17. Instrument - The meeting participants had a problem with stating that an instrument is 'part of a system'. It was recommended that 'assembly' be used instead of 'combination'. A possible definition is 'an individually identifiable item that contributes to monitoring or controlling the state of an item, a process, or the environment.'

**Action Item** - Steve Kline - Talk to Earl Montgomery about a possible definition for instrument from ISA by 1998-03-06.

18. Item - Add this as a new common term. Do we use the definition of plant item and change as appropriate? Do we need 'volume of space' as part of the definition of item? Consensus was that no, we do not. Instead, it was recommended that AP 227 add volume context as a note to explain its use. A possible definition for item proposed was 'A solid material object. An item may be an assembly or collection of items.'
19. Material - It was proposed to change the definition to 'an identified quantity of matter.'

**Action Item** - David Leal - Look at the definition of material further. Should we just say that it is matter?

20. Property - Add this as a new common term and define it as 'a quantifiable aspect of a thing in the real world that can be observed, measured, or derived from something that is observed or measured.'

**Action Item** - Hans Teijgeler - Look at the definition of property further and propose any changes.

21. Stream - Hans Teijgeler proposed the set of definitions he discussed in the Toronto ISO meeting using the concepts of stream segment, stream point, and stream. We should come back to this term since it is a hot potato.

**Action Item** - AP 231 and AP 221 teams - Take the review of the definition of Stream on in parallel and provide a recommendation.

**Action Item** - Andries van Renssen - Provide comments back to the AP 231 team on the terms design package, enthalpy, entropy since they are in the AP 221 class libraries.

**Action Item** - Steve Kline - Look at changing all uses of plant item to item by 1998-02-27.

**Action Item** - Steve Kline - Check the definition of 'item' and 'thing' in the Concise Oxford dictionary and see if we need to add a definition of these terms in clause 3 by 1998-02-27.

**Action Item** - Theo Arntz - Coordinate comments from the AP 221 team on the remaining terms to be defined using the current version of clause 3 from AP 231 and any other terms from AP 221 that are felt to be common terms and provide them to Steve Kline by 1998-03-06.

**Thursday, 1998-02-05**

**8:00 a.m. - 5:00 p.m.      Discussion of AP 221 CD Ballot Comments**

Discussion of AP 221 CD Ballot Comments (continuation)

A continuation of the discussion of U.S. comments to the AP 221 CD is provided below.

**Issue 037** - A description of how to identify conventions used will be provided somewhere in the AP. AP 221 will not be addressing things such as layout of a P&ID, e.g., placement of lines as described in the PIP document. The class library will be extended as needed to support the minimum required classes and properties for the P&ID conformance class.

Mark Palmer commented that a conformance class that addresses the minimum needed characteristics for a P&ID and that includes the perspective from several countries (not just the U.S.) needs to be developed. The U.S. does not want a U.S. only P&ID conformance class. We will use the PIP information as a start for the baseline of the conformance class, but will look for other input. Matthew West commented that his company does not see that there will be much need to exchange a complete P&ID (and hence the P&ID conformance class). It is more likely that the information contained in a P&ID will be put into a data warehouse. Dave Witherell indicated that operating companies and contractors have to exchange P&ID information. The P&ID is an evergreen document.

**Issue 036** - IEC 770-1 is another standard that is used.

**Issue 038** - The AP 221 team agree with class library comments and are working on them. The work process for this effort will provide a listing of proposed additions to the class library along with a time frame for when a response with comments is needed. A simplified discussion on how to use the class library will also be provided.

**Action Item** - Andries van Renssen - Notify the AP 227 and AP 231 project leaders of the next release of the class libraries.

Tom Teague suggested that the AP 231 team look at the CD version of 231 to see what properties and associations could be rolled into the class library.

**Issue 039** - The AP 221 team is already proceeding on responding to this. Look at SP 51 (terminology).

**Issue 047** - The association of properties to a particular class is still a weak point in the class libraries. Connection and connectivity is an area where we really need to focus on harmonizing within the APs. Annex L will be improved, something will be added to the class library for connectivity, and possibly a new UoF for connections will be added.

**Issue 049** - Controls and DCS - The AP 221 team was surprised that there was no comments in this area of the class library. Someone needs to talk to PIEBASE about getting the DCS vendors to sit down and work on this issue to move the controls area forward. POSC/Caesar will be sending about 2000 classes to Andries that cover the controls area based on the Norwegian standard. In the March time frame, a

POSC/Caesar Web site will be set up to provide an example, technical reports, etc. The point of contact for the latest class libraries is STEPlib through Andries van Renssen.

**Action Item** - Graham Bird - There is an organization called OLE for Process Control (OPC) headed by Fisher-Rosemount. Provide information about OPC, available documentation, and its Web site to Theo Arntz and Mark Palmer.

**Issue 050** - AP 221 focus has been on equipment, not the fluids. Some of these things are roles of a thing, not a thing.

**Issues 051, 052, 054, 055, 056, 058** - More of the same discussion as Issue 50.

**Issue 057** - It was suggested that instead of listing some of the properties of a class and not covering all of them, a description field should be provided where the name of the properties can be put in. The AP 221 team responded that if you don't have a standardized listing, then you lose your ability to have a computer interpretable model. It was also suggested that the hierarchies involved in the class library be explained in the AP.

**Issue 059** - AP 221 team is reviewing UoF and object names and definitions.

**Issue 060** - AP 221 team has contacted the SC4 chair to see what mechanisms might be allowed to support removing annex M (class libraries) and publishing the class libraries separately, such that they can be referenced and they can be kept 'evergreen'.

**Issue 063** - The AP 221 team will make the requirements clearer as to how a class is mapped.

**Issue 079** - Need to revisit harmonization on this, particularly with AP 212.

**Action Item** - AP 231 team - Communicate with David Leal as to AP 212/221 alignment and what AP 231 needs to do that is similar.

**Issue 80** - Will put this term in clause 3.

**Issue 81** - From Introduction through clause 4.2 and AAM and ARM, changes will be made to make the terminology as understandable as possible to engineers.

#### Action Plan for P&ID Conformance Class

Bob Fisher commented that there are 3 levels of conformance classes we need: 1st level is like what we currently do for conformance class, 2nd level is the business driven data that are expected to be included, and 3rd level is the mandatory data required.

**Action Item** - Bob Fisher - Write down his ideas on conformance classes so that we can possibly use them in future discussions on how conformance classes should be structured. All 3 process plant APs should take a look at Bob's write-up. Send his write-up to Mark Palmer.

An action plan was developed for defining a P&ID conformance class. This plan is detailed below.

1. Document example usage scenarios for P&ID exchanges

**Action Item** - Pepi Edlinger to develop strawman of usage scenarios by 1998-02-27 and send out via email to Mark Palmer, Bob Fisher, and Theo Arntz. Mark, Bob, and Theo to review and comment on strawman by 1998-03-18. Theo to circulate to AP 221 team on 1998-03-18 for confirmation.

2. Document selected set of P&ID information content that will be supported by a subset of the class library and the P&ID conformance class and in a statement in clause 6. Annex L should show minimum core set and how it may be extended

**Action Item** - Mark Palmer will prepare a summary of the development plan so that we know what we are asking the vendors to support. - Dave Witherell/Mark Palmer to provide to Hans Teijgeler the information content portion of the PIP document. Mark and Dave to discuss and Mark to send to Pepi Edlinger, Hans Teijgeler, and Rob Moonen (via Andries van Renssen) by 1998-03-05. Mark will put together an email listing of the workers on this task. This group will take the documentation of Task 2 and use the SPI-NL P&ID to confirm that everything needed is covered. Need to assess the symbology to be used in the core data and the baseline P&ID case.

**Action Item** - Mark Palmer to take the action to follow up with the vendors (those who support data flows relevant to the usage scenarios) to solicit participation. David Adam to raise the issue with the EPISTLE implementers forum. Suggested vendors were Intergraph, CadCentre, Dassault, Rebis, EA Systems, Jacobus, and ICS (Rapid).

**Action Item** - Jan Sullivan to provide EXPRESS-I and Part 21 representation for P&ID example from first AI under Task 2. Will not include geometry. David Leal to document the path for a getting CAD vendor to export graphics in a Part 203 format that Jan could then massage into a form we could use. It was suggested that ISO 10628 has symbology we should be using.

3. Document example usage scenario for purchase of items identified on a P&ID (leads to an equipment data sheet). This is not a part of the P&ID conformance class. We're talking about procurement of an item that may exist on a P&ID many times and have an identifier on the P&ID.

**Action Item** - Pepi Edlinger and Theo Arntz - Develop example usage scenario by 1998-03-10.

4. Document selected set of equipment data sheet information content. Combine with Tasks 5 and 6 to cover 1 equipment, 1 instrument, and 1 line of piping material.

**Action Item** - Andries van Renssen to circulate a SPI-NL data sheet document and a list of document types. This could be a proof of concept by doing 1 piece of equipment. Identify a sufficiently compelling example to show that AP 221 can do what the U.S. needs it to do.

**Action Item** - Earl Montgomery - Provide populated data sheets for a control valve, relief valve and piping by 1998-02-23 to Andries van Renssen and Mark Palmer.

**Action Item** - Andries van Renssen - Populate a representative subset of the data sheet information into the ARM and then into the AIM. Need a stable DIS version ARM before he can start.

**Action Item** - Jan Sullivan - Produce a set of instances in EXPRESS-I and Part 21 file based on the pump data sheet on the SPI-NL Web site.

**Action Item** - Bruno Schilli - Provide Pepi Edlinger input on IEC 1360. Should we reference this in the usage scenario. Bruno to provide input to Pepi on this standard.

5. Document selected set of instrument data sheet information content.
6. Document safety related information usage scenarios (relief valves?) - safety and control schematics

The remaining tasks were felt to be too far out in time to be worth attempting to assign resources and scheduling at this meeting.

7. Define usage scenarios for other schematic plant documents (e.g., loop diagrams, elementary diagrams, logic diagrams, electrical schematics, etc.) - Hans will undertake some preliminary work in getting the types of documents needed for this work.
8. Information flow from AP 231 to AP 221 to AP 227 is what we want to achieve

**Action Item** - Theo Arntz - Deliver status reports on AP 221 and discuss issues that need some face to face interaction at next ISO meeting in Germany. Deliver status by 1998-05-11.

**Action Item** - Mark Palmer - Set up an email exploder for this group to use by 1998-03-06.

**Action Item** - Dave Witherell - Provide a copy of the PIP document to the AP 221 team as soon as it can be released.

The AP 221 implementation handbook is available on SPI-NL Web site.

**Friday, 1998-02-06**

**8:00 a.m. - 12:00 a.m. AP Harmonization for Plant Engineering and Operation**

Process Industries STEP Application Protocols and Inter-AP Information Flows - Diagram from Hans Teijgeler provided to meeting attendees.

Comments to this handout were:

1. Make the connections between 221 and 227 and between 227 and APxxx (manufacturing & fabrication) two way.
2. Interface between 227 and 230 should be looked at closely.
3. Arrows between APs describe what information is passed between the APs. This information is what needs to be looked at very closely.
4. Concrete structures is something that is currently missing. Could be addressed in 225 version 2? Foundation design, piling design, also needs to be covered somewhere.
5. There should be a direct two-way link between 221 and the plant operations APxxx.

There will be a harmonization meeting between APs 225 and 212 in Germany prior to the ISO meeting in June. Summary of results should be available to other APs in June.

**Action Item** - Steve Kline - Send a copy of the process plant glossary work on common terms done to date to Mike Ward by 1998-03-06.

Non-explicit geometry in APs 230 and 227 should be represented the same way. Interpretation of AP 230 is getting underway in the next few weeks (with P.D.I.T.Inc). Geometry is a key issue being raised on AP 227 and will be worked in March in a comment resolution workshop. Clash detection is the main business requirement for having the 3D characterization of items in these APs represented in a similar manner.

**Action Item** - Mark Palmer will talk to Julian Fowler (PDT Solutions) prior to the AP 227 workshop for input on the geometry area.

AP 212 scope includes automation systems (e.g., DCS). This is something that was not recognized by others prior to now. We need to look at this AP more closely.

Wolfgang Haas commented that we need to do more PR on STEP to industry (possibly through PIEBASE). He suggested that we want to try to get commitments (MOUs) from individual companies, not just consortia, to commit to use of STEP. Mark Palmer suggested that Wolfgang get something started in Germany and then we can expand it elsewhere.

**Action Item** - Mark Palmer - Send Wolfgang a copy of the PIEBASE MOU. Wolfgang will modify and then circulate for comments to Stuart Lord, Niko Williams, Mark, Bruno Schilli, and Johan Scuttle.

Jay Roberts commented that if you can show the companies that something works and provides them with some benefit, then it is easier to sell the top management on supporting something. Julian Fowler commented that we need to point out the success stories to get interest.

#### Connection and Connectivity (C&C) Discussion

- Six Month Objectives
  1. Understand the requirements for C&C
  2. Understand the C&C models and possibly with ARM representation
  3. Understand the C&C AIM solutions
- Participants/Stakeholders
  1. AP 221 - Jan Sullivan
  2. AP 212 - Rinehard Nerke
  3. AP 230 - Mike
  4. AP 227 - Mark Palmer
  5. AP 231 - Mitch Gilbert
- Additional factors
  1. AP 210 - Tom Thurman

**Action Item** - Mark Palmer to contact

2. AP 214 - Guenter Staub

**Action Item** - Bruno Schilli to contact

- Process for completion
  1. Today - summarize what we can do - define 'white paper' template
  2. Produce 'white papers' summarizing AP C&C requirements
  3. Circulate 'white papers' among the participants by 1998-04-06
  4. Review and provide requests for clarifications back to white papers by 1998-05-01
  5. Produce and distribute summary paper - **Action Item** - Julian Fowler by 1998-05-06
  6. Work on a solution at June ISO meeting
- White Paper Template
  1. AP project number and scope
  2. Point of contact
  3. Current status of AP and N number of the latest version
  4. Statement of requirements
    - a. Use text and diagrams.
    - b. Describe what is connected to what

1. granularity
2. composition/decomposition
3. levels of abstraction
4. involvement (e.g., welds, glue, bolts)
5. features of the connection
- c. Type of connection (e.g., logical).
- d. Cardinality of connection
- e. Examples of use
5. Description of relevant ARM constructs
  - a. Use text and diagrams.
6. Description of AIM constructs
  - a. AIM entities or lack of AIM constructs

Minutes Submitted by Steve Kline

## WG3/T21: OIL AND GAS

WG3/T21 minutes were not available at time of publication.

## WG3/T22: BUILDING CONSTRUCTION

(full version available as html from:

<http://www.leeds.ac.uk/civil/research/cae/step/meetings/orlando.htm>)

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Attendance

National reports

AP225 Building Elements using Explicit Shape Representation

AP230 Building Structural Frame: Steelwork

AP212 Electrotechnical Design & Installation

Technical ISO presentations

STEP related initiatives

Bad Aibling draft agenda

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## National reports:

### *Finland*

Work on the [VERA](#) project (concerned with information networking in the construction process) continued alongside other national projects. There were now 45 Finnish organizations affiliated to the IAI (out of 110 Nordic Chapter members).

### *Germany*

EDIBAU and GAEB were active in the area of data exchange, but, because of a shortage of funding, EDIBAU, which contributes to EDIFACT standardization, had not been so active of late. The activities of GAEB were centered on data exchange during the tendering phase.

Another data exchange initiative involved the association of the German system vendors for the building/construction industry (AGSV). They were currently developing a specification for data exchange between CAD systems and systems for alphanumeric documents such as building specifications and bills of quantities. A first draft in German language would be available in April 1998.

The CDS initiative (using 10303-214, -202, and -225) continued. A timber initiative - using the "Produktschnittstelle Holzbau" (product model for timber construction) was underway and there was now a strong IAI chapter in Germany. Karlsruhe University were working on the modelling of the building life-cycle and work continued a product model for roads in Germany.



### *Japan*

There had been no major developments in Japan since the Florence meeting - apart from the economic problems caused by the financial crisis affecting South-East Asia. Industry in Japan was proving to be resistant to change but the Ministry of Construction were attempting to promote electronic commerce - including the use of digital cameras and of electronic verification. New financial resources had been made available by the government. As has been anticipated at the Florence meeting, funding for the Construction CAD data consortium had now ended, but the work of this body would be continued - on a smaller scale - with the backing of industrial money. The IAI were still active in Japan, and two new STEP initiatives had begun. Many teams were still engaged in the study of IAI and STEP activities. One six-month project was concerned with tendering systems, and three working groups were experimenting with use of the internet and edifact in tendering.

### *Netherlands*

A GIS interoperability project (directed at the creation of a GIS umbrella standard) was underway; as was an initiative to promote the use of STEP in the civil engineering industry. Development of the BAS "construction information framework" continued and had growing support.

### *Portugal*

The [funStep](#) project (to develop a STEP-based data model for the integration of manufacturing and retailing in the furniture industry) was a two and a half year long European ESPRIT initiative. In addition to the development of a standard for the exchange of furniture product data, the intention had been to had been to promote the development and usage of STEP related tools within industry in general. The project had been a big success and those involved in the industrial consortium were considering how the work already carried out could be built upon. An international funStep Interest Group was being set-up in order to transfer and share project results with third parties in a co-ordinated manner. A New Work Item for the furniture domain was in preparation and would shortly be submitted to ISO.

Portugal was also contributing to ESCN - European STEP Centers Network - which was an European ESPRIT project with the main objective of establishing and executing a STEP/PDT training and technology transfer programme. This initiative would provide an essential foundation for the use of STEP by European industry.

Finally, Portugal was also going to be involved in SUMMIT - a European project beginning in early 1998 - that would create, implement, test and evaluate an EDI-based communication infrastructure between the various partners involved in constructional manufacturing processes. SUMMIT was dedicated to the exploitation of both the STEP and the EDIFACT approaches to product and process data communication. The aim was to combine the (complementary) advantages of both approaches (business versus engineering data).

### *Singapore*

The [CORENET](#) project continued, and the Singapore IAI chapter was still active.

### *Sweden*

An 5 year initiative, which was just beginning, was "IT construct 2002" - which will be a research and development project concerned with IT for construction and facilities management. It will focus on three areas - research, standardization and implementation in Construction. There was a widespread and strongly held view in Sweden that the IAI and STEP should merge their efforts. Work on [CONDOR](#), [CONCUR](#) and on the roads product model continued.

### *UK*

The newly established Department of the Environment and Transport (the DETR) were supporting many projects. The "Best Practice Initiative" presented an opportunity to bring together different organizations under a single umbrella. Work continued on European projects such as [CONCUR](#), [VEGA ELSEWISE](#), and [GENIAL](#). A demonstrator project to integrate the use of EDI, STEP, and IFCs was planned, as was an initiative - with STABU - to define requirement specifications for construction. There were six initiatives underway that were concerned with cost planning, including: AIT, PRIMA, ELSEWISE, and URGNET.

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### **AP225 Building Elements using Explicit Shape Representation**

**Wolfgang Haas** (WH), **Shiela Lewis** (SL), **Tatsuo Terai** (TT) and **Nikolay Shulga** (NS):

#### *Progress Update*

FDIS balloting would begin on 1998/04/01; and would end on 1998/06/01. This implied that ATS Part 325 would have achieved CD status by the end of March. Implementors were - in Germany - Nemetschek (Allplan), RIBCON (RIB), Hochtief Software (UniCAD), Gravisoft (Archicad), Softimage, Autodesk; - in Belgium - Graphisoft (ICAADS), Star Informatics (STAR); - in the USA - Bentley (Microstation); and - in Japan - Fujitsu (SuperDressy), Daitec (CADWELL), and NEC. There was also one further implementer from the process industry.

#### *Abstract Test Suite development for AP225 - 13030-325*

The Abstract Test Suites for AP225 (10303 - 325) had been in development for about 2.5 years. There were now 45 test cases and the ATSS would be completed by 1998. Test cases imposed greater rigour on an AP when developed outside an AP project team. If everything went as scheduled, Part 325 would be available as CD by the end of March 1998.

#### *AP325 presentation*

#### *Implementation in USA and Japan*

Implementation of AP227 and AP225 in the US by Bentley Systems (Microstation) had been very successful. Moreover, prior implementation of 227 - and (thus) the STEP resources referenced by AP227 - had greatly accelerated the implementation of 225. It was noted that implementability was a major concern for vendors.

There had also been further implementation work on AP225 in Japan since the Florence meeting by a company, acting in process plant environment.

#### *AP225 implementation in Japan presentation*

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### **AP230 Building Structural Frame: Steelwork**

**Mike Ward** (MW):

CIMsteel funding was coming to an end at the end of February 1998 and the funding of AP230 and related activities was to be taken on by a consortium of steel companies and organizations led by British Steel. MW cited a number of new CIMsteel Registered Developers who had signed up since Florence - adding to the existing list of collaborators - and gave an update on the implementation situation. A great deal of time had been devoted to attending meetings and attempting to raise continuing funding for AP230. New requirements from some key vendors had forced a change of course (and had, therefore, imposed a number of delays) on the developers of the CIS/2.0 model. This would now be a hybrid model (ARM-like but incorporating a number of STEP resources) and would serve directly as the ARM for AP230. The CIS/2.0 model was now complete and could be formally launched on 2 March 1998. MW concluded with a discussion of various issues relating to data management, illustrations of a number of different approaches which had been considered during the development of CIS/2.0, and a presentation of the solution finally adopted.

#### *AP230 presentation*

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### **AP212 Electrotechnical Design and Installation**

**Reinhard Nerke** (RN):

RN reported on the use of AP212 in the context of an initiative by the German based SIEMENS company. He noted that AP212 was appropriate for the representation of data relating to all types of electrical system - regardless of their size. The main focus of AP212 had been on big systems but this AP was also perfectly suitable for buildings.

<http://www.iec.ch/tc3/home-e.htm>

AP212 presentation

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### **Technical ISO presentations:**

*Benefits of interpretation and integration*

[Julian Fowler](#) (JF)

JF gave a presentation explaining the Interpretation and Integration processes in STEP and detailing the benefits - in terms of common representation and interoperability of standards (especially in the area of geometry) - that the STEP approach to the harmonization of data models provided.

Interpretation and integration presentation

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*Developing Abstract Test Suites:*

[Sheila Lewis](#) (SL)

JF gave a presentation explaining the development of Abstract Test Suites within STEP and detailing the role which ATSs played in the testing of applications purporting to conform to a particular AP.

ATS presentation

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*Part 42 revisions*

[Ray Goult](#) (RG)

RG reported that the proposed changes to part 42 were (in general) extensions to what already existed and that upward compatibility would, therefore, be (largely) preserved. The main exceptions were cases where mistakes in where\_rules had been corrected. A discussion of swept areas, truncated pyramids, and other (putative) geometric primitives followed. There was a call (from a number of quarters) for inclusion of the clothoid (curve).

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*EXPRESS-2*

[Phil Spiby](#) (PS)

PS reported that EXPRESS-2 would become an IS by 2000 and that a new document would be published at the end of February 1998. He went on to present some of the features of EXPRESS-2 - including the facilities for passing expressions and evaluations of expressions. More information could be had from:

<http://www.eurpc2.demon.co.uk/part11.htm>

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*Parametrics*

[Mike Pratt](#) (MP)

MP reported that the ISO Parametrics Group had liaison status with SC4 and were developing new integrated resources (which would be upwardly compatible with STEP) to allow the capture of design intent in data models. Such intent was described in terms of geometric relationships, constraints, limits of freedom for dimensions, etc.

Documents on parametrics could be found at:

<http://www.mel.nist.gov/div826/subject/sc4/paramet/long/n082/>

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## *Generic resources*

### [Greg Paul](#) (GP)

GP explained something of the history of STEP generic resources and went on to say that these resources had proved to be generally fit for purpose. Changes and extensions were being considered - within the constraints imposed by consideration of upward compatibility issues.

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## *Modular APs*

### [Greg Paul](#) (GP)

Modular APs represented an extension of the AIC principle, but whereas AICs were (basically) bits of AIMs, the proposed modules were mini-APs with fully developed reference models. This development would be a further contribution to the interoperability of APs.

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## **STEP related initiatives:**

### *STEP-CDS*

#### [Wolfgang Haas](#) (WH) & [Michael Endres](#) (ME)

There was an initiative involving a number of companies (including ABB, VW, Daimler Benz, BMW, KUKA, Porsche and others) who were interested in starting to exchange some of their 2D-CAD data using STEP technology. The initiative had been launched on 7 October 97 at an industry awareness meeting hosted by Daimler Benz and was focused on the exchange of 2D data relating to industrial construction. This meeting took place under the umbrella of the German Building Ministry. It used a subset (the construction drawing subset - CDS) of conformance class 4 of AP214 - which is identical to conformance class 2 of AP202. Implementation (by Bentley, Autodesk, Nemetschek and others) were scheduled to begin in January 1998 and the first implementations should be available in June 1998. This schedule had been discussed at a first "round-table" meeting of implementers on 1998/01/22, and the system vendors had argued that the proposed schedule was too tight. They would prefer to postpone the date for first implementations until autumn 1998.

STEP-CDS presentation

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### *The [funStep](#) project*

#### [Ricardo Gonçalves](#) (RG) and [Miguel Borrás](#) (MB)

MB and RG gave a presentation devoted to the success of the funStep project and announced their intention to consider using their results as the basis of a new Application Protocol.

#### *funStep presentation*

The project had begun in 1996 - arising from the work of more than 10 national and European projects undertaken during the previous seven years - and would continue until 1999. FunStep was now in its industrial implementation phase and - by its end - would have employed 13 person-years. Organizations in 15 countries had expressed interest in participating in the funStep Interest Group initiative: 35 furniture companies, 17 software houses, 6 trade associations, and 24 others - including academic institutions.

There were now two actual implementations. Further details from:

<http://www.uninova.pt/funStep>

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## *IAI - Progress, Memorandum of Understanding and Co-operation Guidelines*

### [Hiromichi Schimizu](#) (HS), [Arto Kiviniemi](#) (AK), [Graham Storer](#) (GS) & [Väino Tarandi](#) (VT)

VT explained the requirement for a memorandum of understanding (MoU) to be drawn up between organizations with applying for liaison status (such as the IAI) and SC4. VT then went on to relate events

in Florence and the decision to choose Graham Storer and himself as editors of the "Guidelines to accompany the MoU". It was decided to combine the MoU and the guidelines, and the following text - edited by GS - was agreed:

text of MoU

AK went on to provide a progress update on the activities of the IAI and to report on the release and demonstration of version 1.5 of the IFCs.

IAI update presentation

HS spoke about the work carried out in Japan, towards version 3.0 of the IFCs, on behalf of the structural domain committee members. He reported that while reinforced concrete and structural foundations were being addressed, there were still strong requirements to address structural steel and structural in situ concrete - a popular type of structure in Japan.

Structural IFCs presentation

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*Classification*

[\*Kees Woestenenk\*](#) (KW)

KW gave a presentation which illustrated the various principles embodied in traditional classification systems and in the new object based Bouw AfsprakenStelsel (BAS) approach - "Construction Information Framework". This framework had originally arisen from a collaboration between three main areas: geometry (CAD), quality (specifications) and cost estimation. The intention was to set up an integrated structure, containing a common set of "Objects of Interest" for each of the areas. It would then be possible to represent common objects geometrically, specify them in a specification system, and to estimate their costs. Although it had begun as a voluntary cooperation, BAS was now a formal organization, supported by industry - with the most important industrial partners represented in the board. The organization will not limit its activities to the three aforementioned areas, but these areas will continue to provide a primary focus of interest.

Classification presentation

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[\*SteelBase\*](#)

[\*Raimo Pehrsson\*](#) (RP)

SteelBase presentation

RP announced that the SteelBase Browser was now fully DEP4 compliant and had also adopted a DSTV model for the representation of data relating to numerically controlled machinery. SteelBase were now working on the extension of their data model to cover cold rolled steel sheeting - as is used in cladding - and proposed to add Edifact capability in the future.

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*Civil Class Library*

[\*Ilse van Koetsveld\*](#) (IK)

IK reported that this initiative was backed by SHELL and by CROW and was devoted to the combination of AP221 class libraries with the AP202 symbol library. A demonstration of a viewer (which was under development) would be given in Bad Aibling.

Civil class library presentation

AP221 to AP202 presentation

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**Bad Aibling draft agenda:**

Note: Meetings in parentheses are non-BC meetings!

*Monday*

(8:00-10:00 AM Opening Plenary)

(10:30-12:00 AM WG3 Plenary)

1:00-3:00 PM WG3/T22 Building&Construction Plenary

- Discussion of the agenda for the week
- short summaries of items on the agenda
- national activity reports

3:30-5:00 PM STEP B&C part 225 status report

- Short Update on 225 including the time schedule (W. Haas)
- Status report of part 325 (W. Haas, S. Lewis)
- Implementers reports, evaluation reports (N. N.)

(6:00-7:00 PM WG3/AEC Team leaders meeting)

*Tuesday*

8:00-10:00 AM AP230 status report (M. Ward)

10:30-12:00 AM FunSTEP status report (R. Gonçalves)

1:00-5:00 PM STEP-Building&Construction related projects

- STEP-CDS initiative
- Additional other projects, to be determined

*Wednesday*

(8:00-10:00 AM Liaison Plenary)

10:30-12:00 AM STEP highway projects

- Swedish Highway project
- Other national activities (The Netherlands, Japan, Germany, to be confirmed)

1:00-3:00 PM AEC projects, relevant to Building & Construction

- AP227 Plant Spatial Configuration & Mechanical Connections
- AP221 Detailed Process and System Design & Hardware Specification

3:30-5:00 PM STEP implementation methods and environments

- SDAI
- C Language Bindings
- C++ Language Bindings
- Java Language Bindings
- Corba implementation environment

*Thursday*

8:00-12:00 AM Joint meeting with IAI, discussion of technical issues (Agenda to be determined)

1:00-3:00 PM Joint meeting with IAI, discussion of technical issues (Agenda to be determined)

(1:00-2:00 PM Joint AEC meeting, in parallel)

3:30-5:00 PM WG3/T22 Building & Construction closing plenary

- summary of the results of the week
- action items for the time until the next meeting
- agenda for next meeting

*Friday*

10:30-12:00 AM Meeting of DIN NAM 96.4.3

1:00-5:00 PM Industry day, organized by IAI and WG3/T12 Building & Construction (Agenda to be determined)

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Minutes Submitted by Mike Ward

## **WG3/T23: SHIPBUILDING**

Attendees: Zabi Bazari, Burt Gischner, Christine Grafe, Matthias Grau, Jeff Guy, Jochen Haenisch, Yuanxie Janke-Zhao, Hiroyuki Kakuno, Ben Kassel, Uwe Langbecker, Pete Lazo, James Mays, Richard Myers, Gerry Radack, Abdul Rahim, Robert Schuler, Somendra 'Sam' Singh, Frank Stolte,

Masanori Takasuka, Tim Turner, Ron Wood

The following annexes can be obtained by sending an email request to mays\_jim@hq.navsea.navy.mil

**List of Annexes:**

Annex A - Acronyms  
Annex B - Interpretation of PLIB services  
Annex C - ISO Ship Schedule  
Annex D - Action Item List  
Annex E - Draft Bad Aibling Agenda

***SUNDAY, FEBRUARY 1, 1998***

Jim Mays opened the meeting and introductions were made around the room. The agenda was reviewed and liaison meetings were identified.

**Ship AP related standards status reports:**

**Update on AP215;** Monday Report Pete Lazo provided on Tuesday. Ship Arrangements model has issue resolutions from the last meeting and updated SCM current BBs. Undergoing quality check for wide industry review in February. Issues:

- product structure by space needs walk through
- MariSTEP external Instance Reference used.

**Update on 216;** Frank Stolte, AP 216 discussed ARM, AIM and outstanding issues. ARM frozen in December and update will be ready for SOLIS at the end of February with UoFs clause 4.2, clause 4.3, activity model and ARM EXPRESS-G. Start remapping and hopes to finish it in June. This will be difficult in the time remaining. Prepared EXPRESS-G diagrams of Part 4Xs. Update the Express-G for BBs. A workshop will have to be organized to help create the AIM for AP 216. AP 216, 217 and 218 will be working with Julian Fowler on mapping the common parts of the APs as part of the AP 218 mapping. Frank handed out a copy of the document and would like comments by Mar 30, 1998.

**Update on 217;** Monday Report by Burt Gischner on Tuesday, Burt is officially taking over from Doug Martin on the Ship Piping AP. 17 BBs revised based on MariSTEP demo. MariSTEP review led to changes in:

- Distribution representation
- Engineering parts
- Equipment
- Interconnections
- Paths
- Piping parts
- Piping specifications
- Piping System

Planning to freeze piping AP after this round of changes are made. Ron Wood offered to help with piping BB maintenance. Plan is to get Julian Fowler to help complete piping interpretation by end of summer. MariSTEP Schema is frozen from Nov 97 and demonstration is anticipated in June 98.

**Update on 218;** The schedule was provided. AP 218 has passed SC4 milestone 20.20. The structural parts improvement group close to finish. Completed structural\_systems, plates, profiles, structural features. Will work corrugated bulkheads and bevels at this meeting. External\_instance\_reference to be included. Several BBs replaced (features/welding). ARM consistent (parsed, linked, long form) New BB Express-G available (long form underway)

AP 218 ARM stable around beginning of March and preparing for interpretation May 18<sup>th</sup> - 29<sup>th</sup>. AP 218 ARM implementations, next generation of processors in SEASPRITE planned for March.

**Update on 226;** Zabi Bazari, The industry report II N703 was produced. The 4th Experts working group met and industry report II was reviewed. AP 226 CDC working draft (N718) was produced. The Application Activity Model (AAM) is fully developed with diagrams and definitions. A second project MOSys in support of operational phase of ship machinery systems was formalized with the CEC. Work on identifying 226 classes has continued. The exchange of 'equipment specifications' was agreed as the EDIMAR exchange scenario. Continuing liaison with TC8 and the Process Industry.

**AP212 Introduction;** Somendra Singh, entities have been added since the San Diego meeting so it is not as stable as AP 212 editor had hoped. Issues to be addressed are: Utility of AP 212, Interoperability with IEC 1360, Interoperability with Ship Common Model and need for richer representation.

**PLIB,** Monday report

### **STEP Ship Project Reports**

**ECRC;** Working PLIB and Electrical model. Results of PLIB survey due July 31. Business case analysis is due September 30. On AP 212 effort: Fault Current Analysis by February 15, Cable and Breaker sizing by February 28, Cableway arrangement by Mar 31, Equipment arrangement by April 30, Cable and circuit routing by May 31, Connectivity check by Jun 30, Graphic representation by July 31, Usage guide by October 15. EMSA may have business case analysis information that they can share with NIDDESC for ECRC business case development.

**SEASPRITE;** Frank Stolte, Key parts of models are now frozen. The business case specifications are published. Demonstration of structures in successfully done of panels and plates in December of 97. Follow on demonstrations will include more entities from AP 218. Full business case exchange is on target for the end of 1998. The SEASPRITE test schema was handed out on disk.

**EDIMAR;** Zabi Bazari, EDIMAR is on schedule for AP 226 development. A pilot demonstration for 'equipment specification' in general and 'crane specification' in specific is on agenda.

**MOSys;** Models for Operational Reliability, Integrity, and Availability Analysis of Ship Machinery Systems (MOSys), Zabi Bazari, Duration is from Jan 98 to Dec 2000. Approximately 19 man-years of effort is in plan. AP 226 is being enhanced to address reliability, availability, maintainability, survey, inspection and repair.

**MariSTEP;** In second year of a three year project to demonstrate AP 215, 216, 217 and 218. Requirements and functional design of project are complete. They are in stage 1 which has half the team working half the APs. In stage 2 the other half of the team will look at the other half of the APs. Schemas are under configuration management. A Systems Requirements Document captures team member agreements beyond the AP schemas. Initial translators are due in March and test team begins in April 98. Funding cut will affect team member's ability to participate in ISO meetings. Information is at <http://www.intergraph.com/federal2/projects/step> .

**NCALS;** Abdul Rahim, completion is in March, <http://www.ncals.cif.or.jp/ncals/e-ncals-index.html> Using HTML, raster, IGES and conformance class 2 of AP 203 to exchange structural data. A Post Ship CALS Project is under planning for electronic submission, verification and approval of drawings and technical documents of generators, propellers, deck machinery and navigational equipment among shipyards, machinery makers and class societies. An additional CALS project for equipment exchange between shipyards and equipment makers.

**EMSA;** Tim Turner, Pursuing SC4 Liaison status. Looking at ship survey information as business case. Maintenance of BB server, web site and e-mail server is continuing. STEP tool kit should be available in



the next week or so. Will allow compilation, resolution of short forms to long forms and HTML. See <http://www.oss.dk/emsa> for additional information. The server has 9 new BBs since Florence and 3 BBs have been replaced. Voting on AP 218 AIM, Decision by Feb 6.

**NIDDESC;** Highlights of the last meeting were the signing of a MOA with EMSA and the need for a business case analysis on the benefits of STEP.

**CALYPSO;** Demonstration of AP 216 underway. 216 will also create and use some further but less formal EXPRESS data structures for the exchange of hydrodynamics and CFD run control input data. The latter data will 'point' to an AP216 file that contains as completely as possible the geometry model. Object oriented technology will be used.

**Ship Operations PNWI AP,** Jochen Haenisch, Ships Operational Logs, Messages and Records. Parts of the scope have been removed that are covered by AP 226 so that needs to be harmonized. Standard tags (nameplate) information ,IEC 1162-4, needs to be harmonized. In scope, equipment status, environmental operations, hull stress in real time, navigational data and tank monitoring. Ship events and ship activities should trigger operational data to be collected. See <http://www.oss.dk/emsa/pro-doc/pro-doc.htm> for a draught copy of the document.

**Working Group -** Beveled plate edge features working group (Grau and Haenisch) met for additional discussion.

## ***MONDAY, FEBRUARY 2***

### **SC4 OPENING PLENARY**

Key point in plenary is that if all countries agree we can skip the FDIS and go straight to DIS. This is an opportunity for the ship team to get products out there faster and at less cost and time.

**AP modularization -** The ship team expressed interest in having Gerry Graves talk about AP modularization. Jim Mays will pursue getting that on the agenda with Gerry.

**Status of AP 217** provided by Burt Gischner. Report under the Monday heading where it originally fell on the agenda.

**Freezing Plans -** Discussed the freezing plans for the ship APs.

- SCM 1.0, frozen in Dec, 1997
- AP 215, planned Mar 31, 1998
- AP 216, frozen Nov 30, 1997
- AP 217, planned Feb 28, 1998
- AP 218, planned Mar 30, 1998
- AP 226, planned Mar 30, 1999

**AP 226 walk through** was done by Zabi Bazari. All the diagrams have been completed for the Ship Mechanical Systems ARM. It has been enhanced based on the industry review. The classes were expanded. It has gone from 88 to 212 objects and from 12 to 34 UoFs. Engineering Analysis models have been integrated into the WD. Task related information is decoupled from the product data. Naming of UoFs has improved in this version of the model. Shape, design, operational characteristics, task information, and general equipment characteristics are considered as conformance classes. The general equipment characteristics conformance class information will be demonstrated in EDIMAR. We then walked through the figures that showed the data models. External referencing is still a major problem. They have a need to go down to the component level at some point, but that has not been done yet.

MOSys would look at faults and failures that are in the AP 226 model. Connections are identified by they are not meant to be external references. The connections identify the type.

**NSRP Electrical Model Mapping to AP 212** , Somendra Singh. The scope was covered, electrotechnical, equipment, terminals, etc. Fault current circuit analysis was covered as an example of ship electrical requirements. More than half of the AP is taken up by documentation. Very few of the UoFs are electrical in nature. External reference is mostly concerned with IEC 1360 interoperability. That covers electronic components, but it is not electrical in nature. It does not even cover motors.

Issues

- Non electrical nature of the AP
- Conceptual integrity of the AP
- Large number of generic relationships
- Large number of select types, over 20
- Ambiguity in mapping
- Redundancy and documentation, 6 port definitions that look identical
- Incompleteness and inconsistency, large number of undefined objects, inconsistency between supertypes and subtypes, text and diagrams
- Difference in levels of abstraction
- Incompleteness in IEC 1360
- Unclear interoperability, AP 212, IEC 1360 and PLIB
- Interoperability with AP 210

Discussion followed on whether AP 212 would support ship electrical requirements. An attempt was made to evaluate the options against the criteria. Low, Medium and High were the weighting.

Criteria	AP 212 do nothing	AP 212 with T23 comments	AP 212 Plus	Ship Electrical Model
Utility	L	M	H	H
Interoper	N	N	L	M/H
Ease of Imp	L	L/M	M	H
Cost m/y	1	3	3+3	5
Time yr	2	3.5	4	5

An extensive discussion followed the attempt to make the evaluation less subjective. The committee agreed that making AP 212 rich enough to support ship requirements would be too difficult at this time. There would be ship common model interoperability issues. The ship plan will call for us to plan to make our own ship electrical AP in the future. If the resources to do for an electrical AP are available after AP 212 is implemented by CAD vendors, we should relook at the AP. Somendra will continue to work with AP 212 to inform them of our concerns and the experience gained will be used to better document the ship requirements.

### ***TUESDAY, FEBRUARY 3***

**AP 215 Walk through** , Pete Lazo, walked us through the document. There were multiple identical entities, except for spelling. One followed the Part 41 that had American spelling and the other had the correct English spelling in accordance with ISO policy. We decided to use the Part 41 spelling. We think the Oxford English dictionary is now including American spelling that makes part 41 correct. The UoF and Applications Objects section is over 80 pages. We walk through enough of them to establish confidence in the model in general. There are over 75 pages of Express G that we leave as an exercise for the student to review. Pete mentioned that fold out pages would help the review process in the documents.

**Ship Common Model Walk Through**, Tim Turner. N701 has the ship common model (version 1.0), registered as of 1997/12/31. It has been posted on SOLIS under [http://www.nist.gov/sc4/wg\\_qc/wg3/n701](http://www.nist.gov/sc4/wg_qc/wg3/n701). The long form compiled (ignoring interface errors) under both EPM and ProSTEP tool kits. Documentation follows the model. For the documentation, Tim needs input from people with experience in PERL script, arrangements, configuration management, features, materials, units and externally designed references. When should we next freeze the SCM? It needs to be gradually improved as APs provide BB information. The SCM needs to be upwardly compatible if we are going to be able to complete these APs and achieve the goals we had hoped by freezing them. Tim walked through the product structure, product definition framework, support resources and utilities diagram.

**WG3 Plenary Report**, Tim Turner, AIC cross reference (Tim provided latest information from T23). AP coordination procedures were delayed as a discussion point until Thursday. AP editors need to check other APs to make sure they are harmonized, this process is not working but the discussion was delayed. Discussed Y2K issues. This impacts references by APs to the part 40 series documents which correct Y2K problems. WG3 recommends that we go ahead and use SGML. Movement of WG3 meetings was discussed but they have to avoid conflicts with convenors meetings. It is being considered.

**Express X**, Frank Stolte, Time consuming, Mapping necessary before Express X is used because it needs a target, might be useful for implementations. Most advanced with EPM but no mapping table support. For AP development, Express X will probably not be useful. For implementation though, it might be useful. It would help create and Express mapping of your internal data structures since it does not change. You can generate programming code to go from one schema to another if you have figured out the mapping.

**ITI Mapping Tools**, Shantanu Dhar, ITI is working with NIST to develop tools to help document reference paths between ARM and STEP resources to automate creation of AIMs. As part of their efforts to automate the testing process they have created validation tools, test management tools and test suite tools. This talk focused on the Reference Path Generator (RPG) and the abstract test suite development tool kit which provides automated (not automatic) assistance to the human doing the mapping.

- Generates validated reference paths from ARM to AIM
- Works in automated or manual mode (multiple paths or partial developed paths by user)
- Maintains mapping table state
- Generates postscript and ASCII that is essentially in the AP format.
- Allows rapid iterative development of the mapping table
- Concurrent evolution of the mapping table and the AIM
- Bound to AIM schema to mapping table
- Bound ARM to mapping table

It is a Sun SOLARIS based tool. He walked us through the Application Object data to examine schemas and entity types and their attributes. Graphical product used by Tom Thurman in AP 210. He thinks the tool saves several months of effort in a complex AP like AP 210. He used the ARM to AIM browser to debug their hand mapping. Funding was provided to enhance the tool set. It is free, but you have to have Sun Solaris Tool kits, C++.

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**AP Modularity**, Gerry Graves, PDES, Inc. Dave Price and Larry McKee, are leading the technical work. The motivation is that the APs are getting too big, too costly and too complicated. Interoperability is a function of interpretation which can be subjective. People have been asking for AP 203 with modular additions. For example add: layers, color, tolerances, notes, etc. Conformance classes would be a suite of modules. Interfaces between the modules is also an issue. You would probably need to interpret the modules with the resources to maintain interoperability. Papers from the latest workshops are on SOLIS in the WG 10 directory.

**Worked Action Items.** Appendix D has the updated actions from previous meetings and the new action items from Orlando.

### ***WEDNESDAY, FEBRUARY 4***

#### **SC4 PLENARY LIAISON REPORTS**

PDES, Inc, POSC Caesar, EPISTLE, STEPLib, ProSTEP, TC 172/SC1 - Neutral Optic Data Interchange Format (NODIF), TC 123 - Tolerances, TC 184/SC 5 - Manufacturing Application Programming Environment (MAPLE)

#### **10.30 - 5.00pm T 23 LIAISON MEETINGS;**

The following list of meetings were attended;

PLIB - R. Schuler  
WG10/PLIB - J. Haenisch  
Parametrics – J. Haenisch  
AP212 - T. Turner  
POSC/CEASAR - Z. Bazari  
AP 208 AIM - Z. Bazari  
Implementers Forum - T. Turner, M. Grau  
Express X - Y. Janke-Zhao.

#### **5:30 LIAISONS REPORTS:**

- **PLIB** Rob Schuler described that the US were now becoming leaders in a number of areas within PLIB. Gunter Staub presented a paper on how APs should use PLIB & is available in Annex B. This has been passed to Pete Lazo as he is developing library references BB.

- **AP 208** is out to ballot - covers configuration Management. Note information. Ship Owners (e.g. MoD) might soon begin thinking about specifying that PLCS be used rather than Ship APs.

#### **- POSC/CAESAR**

0.5 day meeting this week.

3 - parts to this - see last minutes.

ISO 15926-1: Overview of the standard

ISO 15926-2: The oil and gas facilities data model

ISO 15926-3: The methodology for the creation of reference data libraries

Within the SC4 architecture, this fits along side STEP, PLIB & Mandate.

It is based upon EPISTLE (more generic - will enter into STEP somehow (by 2000), lead by POSC/CASER Tech Ltd. as of Jan 1 1998.

The impact on Ships: overlaps for equipment, piping (already harmonised with AP221), and possibly steel structures. Shipyards & Class Societies deliver services to both & are using the same tools; data sharing.

Part 2 = conceptual data model (EPISTLE) - will complete this & part1 by end '98.

Conceptual Data Model seems to be evolving with implementation work.

**- IMPLEMENTERS FORUM** Tim described the main items covered on the agenda of the group.

**Issues** - Mainly issues were discussed in the morning. Many of these were ProSTEP implementation agreements that were raised as issues for the meeting. Shipbuilding need to check on these & provide feedback somehow. Note; the Issue Log & therefore, those agreements that are resolved (agreed or otherwise), forms a Type 3 technical report & therefore, need only one ballot before becoming an international agreement. Impact of this is that you can then base legal contracts on these agreements.

**Geometric Accuracy** - Problem here appears to be trying to work out a solution when a receiving CAD system cannot “tie up” edges of a product because of differences in the accuracy of real numbers etc. For example, recent exchanges show that not all surfaces or curves etc., meet or join as they were originally designed. The accuracy problem is how to resolve this. Where this problem is found the solution is to mainly use a numerical value to describe that if a point is within a certain distance from the surface, then this point should be assumed to be part of the surface. PDES inc. reported on a new tool (STEP DT\_NURBS Tool) based on ACES to handle step files where this problem has been found. Output is a paring of these items that have found.

**Shipbuilding** - Tim presented a quick overview of the implementation results so far in shipbuilding. Implementation going on both in Europe & USA. Concentrated upon the results of the SEASPRITE project as described in the EMSA newsletter. Noted that shipbuilding were starting to look at implementation agreements & EMSA has already reviewed ProSTEP agreements & recommendations from SEASPRITE to form own agreements. No round table yet exists but is being considered as implementation efforts gather pace. He described the role of EMSA & how its helps to support industry needs at the T23 group.

PDES Inc presentations;

**AP Interoperability** - PDES inc. presentations; Upward compatibility of P40s (watch for changes). Part21 will be modified to allow for multiple APs to be in one file and also the KANJI character sets. PDES working on PDM schema - will pull out Product Data Management data from a number of APs (203/214/232). Initial release of PDM schema available on ftp at [pdes.scra.org/pub/apinterop/pdm/pdm13](http://pdes.scra.org/pub/apinterop/pdm/pdm13).

**AP modularization** - PDES inc. presentations; Same presentation as given earlier in the week to T23. Tim pointed out that shipbuilding had been working on a modular approach to ARM development & would continue to contribute to the work on modules & try to conduct some experiments (prob. Within EMSA). The main difference between the BB approach & modules so far is that more than one BB might be needed to create/define a UoF.

**- AP212 LIAISON FEEDBACK**, Jim Mays and Somendra Singh, Met with AP 212 to discuss the issues identified by Somendra in his report to the ship committee. AP 212 has the ability to address most of the issues identified. The problem is that it is an extremely complex AP and that identifying and understanding the solutions of the issues is hard to do. Definitions need to be clearer, entity names appear almost identical and IEC 1360 is not populated with electrical items, only electronic ones. All of these can be resolved with some assistance by the ship community to AP 212 and IEC 1360.

**- PRODUCT LIFE CYCLE SUPPORT (PLCS) NWI**

NATO driven, but acknowledge must be for all industries. Their prime contractors store own versions of PM across the life cycle (Design, build support etc). There is a need to harmonize these (see diagram on

core concepts & task driven requirements on top). NWI introduced in San Diego. Must be able to link back into the life cycle stage. POSC/CEASAR;JSTEP; PDES inc. Etc using PDM schema ....However, Ships different as crew will modify the ship once delivered which would invalidate this. MoD are trying to address this by having an “upkeep” program (EDS) to update configuration/maintenance/inventory management but not much change control. This pulls in all legacy data. Will also be a “waterfront” tool. OASIS is traditional system which was to do this but not working properly. MoD considering using PDM to replace this.

This week will; set up project team under several groups such as STEP experts, domain expert vendors, academic etc, prototypes & pilots, supported by steering group & liaison through TC8; Will have secretariat, & administration staff.

Four APs may be produced for Support Eng, Inventory Mangt; CM/Change control & prod. Maintenance. Inter - ISO workshops being lead by John Dunsford.

[www.pdit.com/lifecycle](http://www.pdit.com/lifecycle)

#### ***THURSDAY, FEBRUARY 5***

**Adjournment discussion.** The committee agreed to complete the meeting at noon tomorrow.

**Upward compatibility of STEP standard.** A discussion followed on whether to make a T23 statement to WG3 that STEP needs to be upward compatible as it grows and matures. Consensus could not be reached on upward compatibility. Individual companies will raise the issue as the see fit. Issues are difficult to reason over & can take much time. Some debate over handling of legacy data over 10 -20 year period, use of conversion software & where STEP will be at that stage in the future. Some members concerned having used legacy data as an argument to industry management for developing the ship APs.

**AP 226 QC Report,** Zabi Bazari, There was a suggestion that the definitions be looked at to see if generic equipment definitions could be drawn from a neutral source. The documents must be written so they can be understood by engineers. Pull out information that is redundant to information in the other STEP parts. WG3 position is that a new N number will be required, even though the changes are not technical. There were some minor spelling and content errors that were not technical. Zabi will get a new N number to send out the N718 replacement with Quality Committee suggestions. Q.C late finishing 7 people took part. Issues on Tech. Writing & editorial aspects. Needs to check front cover & list of definitions. Naming conventions between UoFs and entities (Cookbook?) & part 40 referencing. AP must be industry understandable (note for experience with AP212). Will need a new N number. QC likes to see single schema referencing through the EXPRESS - G. Some problems with the fact that some of the UoFs were too small - some need to be combined to describe a whole concept. Could always have a pre-review with robin & Pete before going to QC.

#### **Structural Part Improvement Group Report,** Matthias Grau,

- Item level type structure reworked (Structural features remodeled; Topology relationships for structural features, parts and systems; Corrugated part/structure introduced),
- Functional definitions complete (structural features (edge cutout, interior cutout), parts (plate, profile)and systems(panel system, plate strake, corrugated structure));
- Early/detailed definitions of design of structural parts and structural system modeled (System - design definition is the early design definition, Parts - design definition is the detailed definition);
- Implicit, explicit, associative definitions of the design of structural parts/system remodeled (clear distinction between definition and representation);
- Definition of the design of structural features remodeled (define features by parameters, by library\_reference, and by explicit geometry).

These enhancements are on the server today. Carefully read the comments that are in the BBs since Matthias has tried to explain how things will work, comments welcome. Corrugated bulkheads, profiles underway by group.

The group met this week on bevels, corrugated bulkheads and profiles.

- They decided to drop the term 'bulkheads' for 'structures' to make it more general. Jochen will model corrugated structures in Express.
- Profiles were discussed. There is a stub entity ready but there is not cross section information yet. Pete will work on that.
- Bevels Feature ????

**Part 45 Materials** Norman Swindells, Part 45 provides the resources for the properties of a product, not for identifying materials. Shape, process and other properties are the three main property groups. STEP is based on creating product models that are a collection of properties. The properties include the chemical composition; association of properties with the conditions in which they are valid; and reliability and uncertainty.

Simple - different test methods yield same values ( density, mass, volume)

Complex - different test methods yield different values (hardness, strength, failure)

Part 45

- All engineering materials are products
- Material properties are a characteristic of a product
- are associated with conditions for which they are valid
- materials data depends on concepts in other parts.

Requirements scenario

- specifications for requirements determined by a classification society
- two types of steel plate
- optional requirements
- maximum values on dissolved nitrogen

Players, shipyard, classification society, welding supplier, steel mills

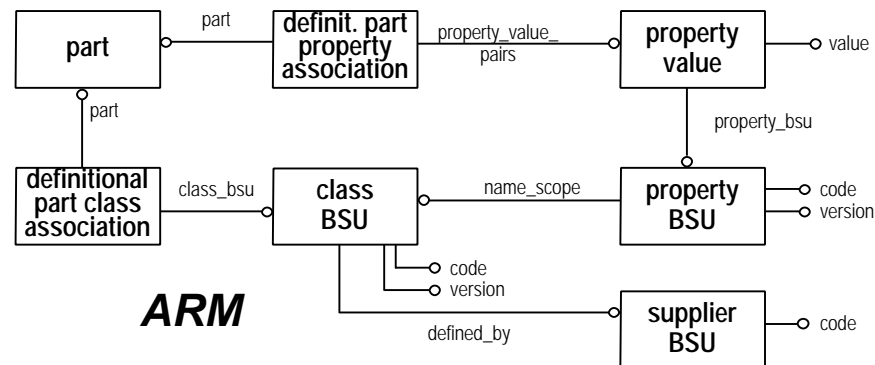
What gets delivered will meet the requirements but there may also be other properties that are included that have important consequences. For example, steel req'd never made before; therefore, Steel co. had to assess composition of liquid steel, thermo mech rolling proc; capacities & perf of rolling mills etc. Prove to Class Society that result will be fit for purpose. Therefore, tests & property assessment needed to be done. Therefore, properties of materials need to be specified along with details of the measurement method and environment.

Materials Information PNWI being lead by Aerospace. Should it be a P100s so all industry can reuse it? NWI will need to assess this.

Impact on shipbuilding?

**SEASPRITE Validation Report**, Tim Turner For AP 218 DNV, OSS and KCS are exporting data. LR system able to import without loss of data (see EMSA Newsletter for more information). Exchanges have highlighted problems that have been resolved. You can select a component and get the properties of it in the ShipRight system. AP 218 exchanges between Lloyds and KCS led Tim Turner to tell the T23 team, "It works!" AP 216 covers basic data for hull forms, pilot was scheduled for Jan. Line wraps, missing or incorrect order of attributes, lack of functional design information, are some of the problems experienced. A discussion followed on whether to enhance hull forms model. The impact on SCM is an issue. The issue raised was about the 216 moulded form exchange. Pete doesn't like the moulded form usage enumeration lists & that a subtype hierarchy could be used. Frank neither. However, there are implications on functional definitions & conformance to SCM. This isn't a fatal flaw. Pete will write an issue & recommendations for review by the group on how to proceed without affecting the SCM

**External reference problem,** Pete Lazo - Recommended interfaces from PLIB were evaluated. We would go in from the library reference BB that brings in the PLIB identifier. It gets you to a class or instance, not sure which. There are two was to get to an instance when you are in the class. The figure is 4-5 in Appendix B



*Fig.4.5: Information requirements for the use of PLIB service 3*

Pete went over how to get 215 to point back to 216 as an external reference example. The use of GUIDs required to determine in advance the order files are processed in.

E.g. Not only do we need to be able to identify the part, we also need to know how to position the part in the co-ordinate space of the model into which it will be placed.

Also, Seasprite differs from MariSTEP approach in that they subtype from the external instance reference entity itself. Perhaps this should be a generic entity and the using system restricts how it is used. Do we need to be able to identify the location (file/db) ?

**Issues** from the issue log were discussed and many were resolved. Look to the issues log if specifics are desired. A couple remain to be resolved. Some of the assumptions remain to be documented some where. This shall need to be revisited at the next meeting. The latest work on how to reference a PLIB part (paper by Gunter Staub) is expected to change by around the end of March, if shipbuilding are using this then should talk direct to Gunter about expected changes.

**AP 218 Workshop,** Yuanxie Janke-Zhao announce the interpretation workshop in May and went over her plans to prepare for the effort.

**FRIDAY, FEBRUARY 6**

**WG3 Plenary Summary**, Tim Turner. Continuing to look at modularity. They have expressed interest in our BB approach. Discussion on SGML and XML, Express may be able to describe the Document Type Definition (DTD) Ishikawa talked about his SC4 AP Matrix from N729. We will try to update it, it is a good document for beginners. EA, T9, is going to look at extending their core model with CFD. T20 developing an NWI for operations data.

### Bad Aibling Scheduling;

WG Plenary 10.30-12noon on Monday

Team ldrs 7 -8pm on Monday.

Open Technical Forum on Tues. morning 8 - 12noon



Remaining agenda information will be sent out separately as Annex E - Draft Bad Aibling Agenda.

Maybe think about putting SCM into a P100 document. Historically there was a p102 but this was cancelled in Kobe. This might be something that EMSA could look into at a later stage.

SC4 milestone schedule update

	AP215	AP216	AP217	AP218	AP226
2.20	03/98				03/98
2.96		06/98	09/98		

Remaining schedule information will be sent out separately as Annex C.

#### **New N Numbers;**

Tim obtained the following N Numbers from Gerry Radack;

729: AP216

730: AP226

731: AP215

732: SCM/Cookbook

???: AP218

#### **Meetings**

Seasprite: 25-28<sup>th</sup> March 1998

EMSA: 23-24<sup>th</sup> March 1998

AP226: Expert Working Group (EWG) 7-8 May

AP218: 18-29<sup>th</sup> May 1998 (2 weeks)

Maristep: 23-25<sup>th</sup> Feb 1998

Maristep: 7-9<sup>th</sup> April 1998

Maristep: 19-21<sup>st</sup> May 1998

**EMSA Agreements Log**, Tim Turner and Jochen Haenisch. An agreements log has been developed to coordinate the scope of demonstrations. Jochen walked us through the examples of agreements that EMSA has agreed on.

**SHIP TEAM ADJOURNED at 10:00 PM to attend the SC4 Plenary.**

Minutes submitted by Jim Mayes and Tim Turner

## **WG8: INDUSTRIAL MANUFACTURING MANAGEMENT DATA**

**ATTENDEES (depending on the session):** A. Bezos (GOSET, France), J. Bradley (Allied Signal, US), B. Cain (Looocked Martin, US), G. Conkol (Camp Inc. US), J. Crusey (NIST, US), J. Deuze (WZL RWTH Aachen, Germany), P. Dumortier (Schneider Electric, France), S. Frechette (NIST US), W. B. Freeman (Team SCRA, US), W. B. Gruttke (Northrop Grumman, US), R. Jochem (IPK Berlin, Germany), M. Johanssen (KTH, Sweden), T. Kjellberg (KTH, Sweden), L. Lauro (UNINFO, Italy), S. Lord (ICI, UK), J.J. Michel (CETIM, France), J. Nazemetz (Oklahoma State University, US), R. Penley (Neport News Shipbuilding, US), P. du Rivault ( GALIA, FR) S. Takeuchi (JSTEP, Japan), B. Young, (Boeing, US), B. Wenzel (EuroSTEP, Germany), G. Ziolk (Northop Grumman, US)

### **1) Adoption of the agenda**

### **2) Adoption of the Florence meeting minutes**

The minutes of Florence meeting have been adopted with some corrections to be incorporated in a further version of that document. In addition to that, the document register has been checked and three documents related to the BSR have been added and referenced as WG8 documents N172, N173, N174.

### **3) Revue of CD 15531-31 V2**

The new version of CD 15531-31 V2 (WG8 N170) as been reviewed page per page. In addition to the editorial modifications needed to meet the SC4 Supplementary Directives, the following improvement have been adopted :

- Every agreed on the new version of the scope, which now contribute as it is to the ballot comment resolution. Furthermore it was agreed that the scope should be split in two sub-clauses : one addressing the scope of the 3's series of part, the second one focused on part 31.
- Section 6 should be improved in order to explain the figure 2, and to point out the link between sub-clause 6.2 and 6.3. That figure, indeed is the core of the document, but can not be normative according to ISO directives. Then the text should be self consistent. It should fully describe the model (and the figure) in a way the figure becomes useless, and only here to provide an illustration and an other way of presentation. Then the section 6 can be a normative section again. In that section « business resource » becomes « resource » (First line), things becomes Objects (Last paragraph of section 6.1), processed becomes transformed (Figure 1). Other corrections have been also adopted, not listed here.
- Section 7 should be a little be developed according to the specific relations of the 3's series of part with the other parts of MANDATE. In the title Part shall be replaced by ISO.
- Section 8 should be rewritten to focus on the specific relations of the 3's series of part of MANDATE with other standards, and especially with TC29/WG34 work, ISO TC 184/SC1/WG7 work (make usage of WG8 N176 document provided by J. Deuze, but also STEP, and PLIB. In an other hand description of the relation between MANDATE and EDI work is not needed in that section.
- Section 9 shall be deleted
- The consistency of the definition with those already provide in other part of MANDATE will checked by J.J. Michel.
- The new document will be send to J. Bradley in order to checked the English Language (British English as required by the directives) by the first or at least the second week of March in order to provide him time for checking and sending back by e-mail by the end of March. J.J. Michel will send the document after last review to J. Crusey (Word 7 A4 format) by the 15<sup>th</sup> of May for preparation of the review meeting in Bad Aibling

- On the request of S. Takeuchi, it has been decided to add ISO 10303-21, ISO 10303-22 and ISO 10303-31 to the normative references.

#### 4) Revue of WD 15531-32

After a presentation by J. Deuze of

- the work made in his Institute on the instantiation of the model for cutting tools
- the clarifications which occurred in that context on the possible overlapping and the relationship with other related work such as TC29/WG34 and ISO TC184/SC1/WG7 work,

the document was reviewed from a technical point of view. It was agreed that a new sub-clause shall be added in actual clause 4 in order the logic of the order adopted in that clause, the relations with the different block now identified in the EXPRESS G diagram (with notes in the text to be compliant with supplementary directives of SC4), and how does that meet the RIM described in clause 6 of part 31.

J. Deuze will propose to J.J. Michel some definitions which will be checked for consistency with the definitions proposed in the other parts of MANDATE and those given in STEP. It was agreed that in the case of the definitions proposed in MANDTE have to be different from those provided in STEP, that shall be explain in footnotes, and they shall nevertheless be compliant with those of STEP.

It is also decided, in particular for consistency with part 31 to add « resource\_capacity » to the entity « resource\_characteristic\_group »

After the presentation of the first proposal of annex C on « Human resources » S. Takeuchi point out that on approbation procedure should be taken in account for human resources. That means that a new attribute (« approval ») linked to « resource\_name » and « date\_time-schema.date » shall be envisaged. That as been accepted. J. Deuze and S. Takeuchi should exchange by e-mail next week in order to propose the corresponding modification in clause 4 and in the annex A (EXPRESS G diagram).

A discussion also occurs on the notion of resouce\_status (part 32) against « state » in part 41. Every body agreed on the fact that a clarification and an harmonization is needed on that point. A decision shall occurs by Bad Aibling.

J. Deuze is afraid of the title of part 32. The group agreed to address a request to SC4 secretariat to change it

since that title has been adopted since Kobe meeting and registered by ISO central secretariat. Then it is not

sure that such a modification will be possible. If nevertheless that could be possible the choice will be made

in Bad Aibling between the following :

- Information Model for Resource Usage Management,
- Generic Information Model for Resource Usage Management.

The discussion on the topic point out the fact that the second one is more understandable and acceptable by the industrial community, but is nevertheless to be use carefully due to the level of generosity.

J. Deuze present the instantiation made in his Institute on « cutting tools » . See WG8 document N176. That will developed by Bad Aibling meeting and will becomes the Informative annex C. J.J. Michel present the French proposal (prepared by Anne Françoise Cutting-Decelle) on « Human resources » instantiation (WG8 document N175). Some question should be clarify (see in particular S Takeuchi's remarks). J. Deuze will try to check the proposal from a technical point of view. French WG8

members will pursue their work on that business case, and a first draft will be provided by Bad Aibling meeting for review by the group.

J. Deuze inform the group of a research work performed in his Institute which can be the basis on an Informative annex D, if the progress of that work which should be presented in March to the PDT days in UK are sufficient. Decision during Bad Aibling meeting.

J. Deuze will send the new document (without informative annexes) to J. Bradley for English checking by the middle of March as for Part 31.

## **5) Future of ISO 15531-2's series of parts**

The concerns about those series of parts are the following :

- The project leader advise WG8 leader that he has to reduce considerably is participation to that work.
- There is for the time being important event and evolution around the BSR from a technical and from an organizational point of view.
- The concepts developed are very near from those provided in the 2's series of part.

J. J. Michel proposed the choice between three solutions :

- Stop the work on 2's series of parts
- Try to obtain the BSR work to be appointed to WG8
- Pursue in an intermediate solution strictly limited and adapted to MANDATE requirements

S. Lord proposed a fourth one based on the usage of STEPLib (shortly presented during the liaison plenary).

It is decided that each member should think about that concern and is invited to make a contribution by Bad Aibling meeting, in which a discussion will occurs on that .

S. Lord give to the Convener two versions of the EPISTLE framework the last one (V2) on paper and another (not the last) electronic version. He will send as soon as possible the last electronic version to be distributed to the WG8.

## **6) Joint meeting with WG10**

B. Wenzel acting as WG10 Convener request more participation of WG8 to the WG10 work on data architecture. He argues that WG8 is the only group which never participate to those work and that from his point of view there is no change in the WG8.

J.J. Michel answer that he fully agree to contribute to WG10. Further he explain that for the time being WG8 do not have enough consolidated resources to contribute actively to all the group it should do such as WG10, QC, WG12, WG3 T7/T11, WG11,.... If the group try to do that, the group will only have joint meeting and never works or reviews its deliverables. The main priorities is for the time being to provide documents for review by the STEP community, and attract experts to contribute to the work.

Nevertheless it was agreed that at least one WG8 member (if possible two or three including in that case the WG8 Convener) will attend WG10 plenary on Saturday afternoon in Bad Aibling meeting. No guaranty for Beijing meeting. But more permanent participation will be settled for 1999.

## **7) Joint meeting with WG3 T7/T11**

During this joint meeting presentations have been made AP219 by S. Frechette from NIST, on AP232 by G. Ziolk from Northrop Grumman, on AP 224 W.B. Gruttke from Team SCRA which was also acting as Team leader.

J.J. Michel has shortly presented MANDATE and J. Deuze the part 32.

In a very short contribution M. Johansson and T. Kjelleberg, explained that for the PWI « Design and configuration of manufacturing system » the orientation is mainly to try to use the AP 214. A first report will be provide by Bad Aibling meeting. A paper on that new approach was distributed .

Nevertheless W.B. Gruttke point out the interest of the session and the participant agreed to maintain such a liaison. Then a joint meeting is scheduled during Bad Aibling meeting on Wednesday afternoon. W.B. Gruttke will make room request.

### **8) Joint meeting with QC production team**

J. Crusey request from the group more active participation to SC4 quality effort. He present and distribute some basic document such as the last version of :

- SC4 supplementary directives SC4 N537),
- Change to the Supplementary directives,
- Slide of the quality training course.

The group agree on its participation to the training course proposed by the Quality Committee during Bad Aibling meeting on Sunday morning.

Some clarification on the SC4 supplementary directives are given by J. Crusey on the request of the group :

- spelling shall use Concise Oxford English Dictionary (British English)
- figures are automatically informative (no precision needed)
- if references to a figure or an informative annex they shall be in notes, not in the text
- it is better to put the EXPRESS G diagram in an informative annex
- at the CD (only) level a reference to an other CD is permitted in the normative references

It has also been decided that :

- A joint meeting with QC production team will take place during Bad Aibling meeting on Thursday afternoon for review of parts 31 and 32
- the two part (31 and 32) will be send by e-mail to J. Bradley for English checking (Middle of March), without the informative annexes.
- the two part will be send to Jesse Crusey by electronic mail and regular mail by the 15<sup>th</sup> of May 1998 in order to prepare the review meeting
- J.J Michel will send by electronic mail to Jesse Crusey the requested preliminary elements of the two part for preliminary review by the beginning of March.
- J.J. Michel will send also to J. Crusey the part 21 and 41. A copy of those part have been send to him at the same time they have be send to SC4 secretariat but he did not receive any thing (e-mail problem to be checked).
- On the request of S. Lord J.J. Michel will check with J. Fowler the impact of the new sheet prepared by the quality committee to prepare the migration to SGML on those future CD.

### **9) Conclusion and program of work**

According to that the parts 31 and 32 are expected to be ready for CD ballot by the summer of 1998.

The agenda of the next WG8 meeting in Bad Aibling will be :

Saturday the 6 <sup>th</sup> of June (afternoon)	WG10 plenary (at least one member of WG8)
Sunday the 7 <sup>th</sup> of June (8 : 00 to noon)	QC training course (every body)
Monday the 8 <sup>th</sup> of June (10 : 30 to 17 :00 )	Review of part 31
Tuesday the 9 <sup>th</sup> of June (8 : 00 to 17 : 00)	Review of part 32 and informative annexes A joint meeting WG12 is also scheduled on integrated resources during the afternoon (time to be defined)
Wednesday the 10 <sup>th</sup> of June (10 : 30 to noon)	First review of ballot comment on Part 1, 21, 41
(13 : 00 to 17 : 00)	Joint meeting with WG3 T7/T11
Thursday the 11 <sup>th</sup> of June (8 : 00 to noon)	WG11 presentation on EXPRESS
( 13 : 00 to 17 : 00)	Joint meeting with QC production team for the review of part 31 and 32 against the SC4 supplementary directive

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## **JWG9: ELECTRICAL AND ELECTRONIC APPLICATIONS**

**Attendees:** Reinhard Nerke, Thilo Besekau, Harold P. Frisch, Tom Thurman, Denise M. Olsen, Satoshi Ito, Clayton Rains, Brenda M. Young, Frans van Noesel, William B. Freeman, Andre Labat, N. Wade Gibbs

General note:

I = for information  
D = decision  
R = recommendation  
AI = action item

Orlando- 1-98 D: Confirmation of the minutes

JWG9 approved the Florence- minutes (document JWG9/N40-97) without changes.

Orlando- 2-98 D: Adoption of the agenda

The agenda was discussed and adopted.

Orlando- 3-98 I: IEC and other Liaisons

prEN 61690-1 (EDIF 3 0 0) was decided to be published as a technical report with in CENELEC. This decision gives way to publish AP210 as an CENELEC standard.

The Pinnacles project is very positive about using AP210 as exchange format for its product descriptions. Its members are strongly pushing towards an LOI concerning this matter.

Orlando- 4-98 I: Pilot projects and implementations

On AP 210, Electronic Design, two pilot projects are under way:

The electromechanical pilot that aims to integrate electronic and mechanical design, using AP210 and AP203. Participants are

Boeing  
IBM  
Delco  
NASA  
Rockwell

The project has started in the beginning of 1996.

The RAMP pilot project aims at an data exchange scenario where the following data formats may serve as input:

iges  
ipc350  
drawings  
edif

The following data formats are to be generated:

AP210  
drawings  
edif  
AP212 drawings

In an early planning stage is a project that aims at an file repository containing AP 210 and AP 212 files for diagnostic and maintenance purposes.

On AP212 a pilot project is under way. The aim of the E1- project is to prove implement processors for AP212 and to make productive use of AP212. The data exchange is done on AIM level.

Participants are:

DASA  
Debis  
delphi automotive  
Ford  
Mentor  
Harness Software Ltd.  
Siemens  
ViewLogic

The first test rally took place before Christmas. We exchanged AP212 files between three systems (Sigraph, Delphi SLG and Delphi EDP). The results were as follows (short summary).

The following information had been exchanged:

- part identification (master data)
- classification information
- assemblies
- connectivity
- properties

The tests went pretty well.

Point of contact: Thilo Besekau, ProSTEP, (besekau@prostep.de), Dr. M. Wagner, Siemens (manfred.wagner@erl9.siemens.de)..

At Siemens a High level interface (HLI) is under development to ease the use of AP212. This software gives an easy access to AP212 on a high level of abstraction. It is an application interface that allows a consistent use of AP212 in software applications without requiring extensive education of the system engineers.

Point of contact: Manfred Wagner, Siemens (manfred.wagner@erl9.siemens.de).

Orlando- 5-98 I: AP 210 Status and issues

AP210 passed the qualification workshop at end of January. After resolving the qualification issues the document is planned to be published.

Orlando- 6-98 I: AP 212 Status and issues

The technical and editorial issues against AP212 CD are solved. The DIS- Qualification Workshop is planned for the Bad Aibling meeting. A Definitions Workshop will take place beginning of March at CTC, Johnstown/ USA.

Orlando- 7-98 I: AP212 Companion Standard

At its Annual Meeting IEC/TC3 decided to set up an Publicly Available Standard on the use of AP212. This document will define domain dependent subsets of AP212 and Data element Types that shall be used within these domains. The document will be developed as a Web based standardization effort. IEC Central Office already agreed to provide the infrastructure for this activity. The Project description is available as 3/508/INF (<http://www.iec.ch/tc3/home-e.htm>)

Point of contact: Fritz Reuter, Siemens (fritz.reuter@erl9.siemens.de).

Orlando- 8-98 I: AP 210 and AP 212 common Connectivity Model

Functional and physical connectivity in AP210 and AP212 were discussed. A proposal was presented which proved that the product structure and connectivity information objects of AP210 and AP212 are mappable onto each other. This is the cornerstone to allow the future collaborative use of both APs. The



proposal was modified and agreed. For the next meeting a document which contains the definitions of the objects was announced.

Orlando- 9-98 I: Joint Meeting WG3 Shipbuilding and AP212

The use of AP212 in the maritime field was discussed. There are two handicaps that currently impede the use of AP212.

- Currently there is no item classification system for electrotechnical items in place that is specifically tailored to the needs of the shipbuilding community.
- There is still education needed about the use of AP212. To help this issue, a definitions workshop is scheduled for the beginning of March at CTC in Johnstown/PA. For the Bad Aibling meeting a workshop is scheduled on single line presentation.

Orlando- 10-98 I: Joint Meeting WG3 Building and Construction and AP212

AP 212 was presented to WG3/T12 Building and Construction. AP212 seems to meet the requirements on that field. A harmonization effort to identify the AP- portions which are of mutual interest should be undertaken.

Orlando- 11-98 I: Joint Meeting WG3 Process Plants and AP212

There is agreement that throughout the design of a process plant AP 221 and AP212 are needed. This leads to the requirement of an harmonization effort for both of the APs. The portions of the APs that should be subject of such an effort were identified. The results of the effort should be reflected in the DIS version of both of the APs. Unfortunately the funding of such an undertaking is not available yet.

Orlando- 12-98 I: Electro- Mechanical Subsystem Integration

Mr. Wade Gibbs presented a proposal about an AP Module on Electro- Mechanical Subsystem Integration. The AP module is planned to be brought forward by PDES. At this point in time there is significant overlap to the existing APs. A close collaboration should take place to ensure that the new proposal fits well into the existing structure of APs.

Orlando- 13-98 I: Tutorials

Tutorials were held on AP210 and on AP212.

Orlando- 14-98 I: Next meeting

The next JWG9 meeting will be held at the next ISO/TC184/SC4 meeting in Bad Aibling / Germany from 98-06-8/11.

Minutes submitted by Reinhard Nerke

## **WG10: TECHNICAL ARCHITECTURE**

WG10 minutes were not available at time of publication.

## **WG11: EXPRESS LANGUAGE, IMPLEMENTATION METHODS, AND CONFORMANCE METHODS**

Situation of ongoing Projects (as of 2/98)

Stage 0: Preliminary stage

EXPRESS X

Martin Hardwick

JAVA binding to SDAI

Tom Rando

Extension of Part 21 capabilities

David Price

Stage 2 Preparatory stage

10303-11 Edition 2 of EXPRESS language reference manual

Phil Spiby

10303-35 ATM for SDAI implem.

Shantanu Dhar

Stage 3: Committee stage (CD ballot phase)

10303-26 IDL language binding to the SDAI

Tom Rando

10303-34 ATM for part 21 impl.

Christophe Viel

10303-24 C language binding to SDAI

Dave Price

Stage 4: DIS registration and ballot process

10303-23 C++ language binding to SDAI

Tom Rando

Stage 5: Approval stage

10303-22 SDAI

Jan Van Maanen

10303-32 Requ. on Test Lab. & Clients

Sheila Lewis

Preliminary project: EXPRESS X

Situation:

Continued development of a working document for Express-X.

Perspective:

Complete work on the document.

Wait to submit NWI proposal .

Minutes prepared by M. Hardwick:

The PWI Team met for three days and discussed a working draft of a new version of EXPRESS-X. In the course of the three days the group agreed on much of the content of the draft. The remaining issues were assigned to team members as follows:

1. Complete description of CC1 functionality (views).
2. Complete description of CC2 functionality (mappings).
3. Propose extensions to CC1 and CC2 for EXPRESS inheritance.

The team agreed that working draft text should be produced in response to the three action items by the end of March 1998. If these goals are met then an implementable working draft of the new language should be available by the end of April 1998, and a CD Ballot quality version of the language will be reviewed at the Bad Aibling meeting.

At Bad Aibling the PWI team will complete the CD ballot version of the document so that it can be given to the quality committee and submitted to the SC4 member countries with an NWI ballot soon after the meeting.

To allow sufficient time for review, the team agreed to schedule its Bad Aibling meeting from Monday to Friday.

Preliminary project: Java language Binding to SDAI

Situation:

Doc WG11 N042 has been discussed this week.

Documentation of the 3 classes harmonized.

All issues of the log have been addressed.

Workshop presentation of CC3 has been held

Perspective:

Prepare CD to submit with the NWI proposal before Bad Aibling.

Minutes prepared by Tom Rando and Lisa McCabe:

The Java working group addressed its list of 30 outstanding items. The group agreed on resolutions to all issues. The document was revised in order to harmonize the three conformance classes as much as possible. The working group then began the process of incorporating the decisions into the document and editing each section in preparation for its pre-qualification review.

The goal of the SDAI Java working group is to present a CD draft document to PDES, Inc. for a pre-qualification by the first week in March. The pre-qualification should take approximately 3 weeks and then the document editor will present the document to Qualification. It is hoped that we can get Project leader and Convener sign-off during the Pre-qualification time-frame.

The working group presented a workshop on the Java binding on Friday morning.

Ad-hoc group on National character set issue

Situation on EXPRESS:

TC to EXPRESS

P members have received it from the SC4 secretariat.

Other EXPRESS issues raised

Not suitable for TC.

Will be resolved with EXPRESS 2.

Situation on Part 21:

No new input received since Florence for the preparation of a Part 21 amendment to include ISO 2022 and existing codes.

Issue will be closed unless contributors are identified by the end of February.

Preliminary project: Extension of P21 capabilities

Situation:

Selected capabilities

Multiple data sections.

Short names.

Conformance class identification.

Default language identification.

Scope deletion or refinement, CC2 deletion.

Discussion on a potential extension of P21 so that it can be used as a repository for SDAI implementation (rejected for the submission of the NWI proposal).

Perspective:

Continue experimentation of multiple data section proposal.

Prepare NWI proposal and CD.

Minutes prepared by David Price:

The Part 21 Stage 0 project met for one-half day at the Orlando SC4 meetings. The meeting attendees were:

David Price, IBM; John Valois, STEP Tools, Inc.; Martin Hardwick, STEP Tools, Inc, Lothar Klein, LKSoft; D. Arnault, ProSTEP; Christophe Viel, GOSET; David Campbell, Northrop Grumman; Rick Kramer, STEP Tools, Inc.; Praful Patel, CIMIO, Ltd., Hiroshi Kodaka, JSTEP

The progress to date and minutes from the Florence meeting were reviewed and the requirements summary was also reviewed. Several new potential requirements were raised:

38) Support using Part 21 files as an SDAI repository. This includes at least support for the following mapping:

Part 21 file as SDAI repository

Part 21 data section as SDAI-model

Adding the SDAI schema instance concept to Part 21

Allowing references between data sections and Part 21 files

39) Support Part 21 as an exchange mechanism between SDAI implementations maintaining the SDAI data organization.

40) Allow ENTITY definition in a file : for example the definition of the user defined entity.

41) Reference to entity-attribute from an entity. EXPRESS does not support this either.

42) Version of schema in file.

43) No allowed external references (e.g. everything must always be in one file)

As this was the fourth SC4 meeting at which the project met it was felt that sufficient opportunity for requirements input had been provided and a proposal should be made back to WG11 for potential for specific new work items. The team then reviewed the complete list of requirements and developed the following proposals:

NWI : Produce Part 21 Amendment as planned to address character sets

NWI : Produce Part 21 Second Edition including TC, character sets and limited additional capability

NWI : Produce Part 21 Third Edition along with EXPRESS-2

Part 21 Edition 2 Scope Proposal:

Agreed to scope

- Same short name capability for entities, defined types and enumeration item names (8)
- AP Interoperability ( proposing multiple data sections ) (6 as in 10,10,27,43)
- AP CC, or other standard subset, in Header (35, 42)
- Default language in Header (11)
- P21 itself upward compatible (16,17,21,34)
- Remove require all external mapping conformance class (37)
- Either provide useful semantics for or remove SCOPE construct (36)

Issues for WG11 plenary consideration

- Support Part 21 as exchange between SDAI implementations (39)
- Support Part 21 as an SDAI Repository (38)

NOTE: At the WG11 plenary later in the week it was decided to propose deferring these requirements to future editions of Part 21.

Part 21 Edition 2 Out-of-Scope Proposal

Defer all other new capability to be potential Part 21 Edition 3 for EXPRESS-2 support.

An incomplete list includes:

- Parametrics (7,20,22,23,24,25,26,40)
- Cross-file references, file changes, multiple files or other file types (3,9,28,29,30,32,33)
- "Delta files" or "actions on objects" (2,4,5,15,18)
- Others : (1,12,13,14,19,31,41)

Martina Hardwick offered resources to help create a draft Part 21.

Additionally, at the WG11 plenary later in the week the progress of the Part 21 Character Set capability was discussed and at the moment it appears that the non-character set extensions proposal may be completed prior to the character set extensions. Therefore, we may propose that the character set changes

be proposed the later new edition NWI and the requirements discussed at this meeting be the NWI an amendment to Part 21.

## Part 11

### EXPRESS 2nd Edition

#### Situation:

Review of document WG11N041

Review of dynamics, expressions as data types.

Review of graphical representation.

Introduced complex entity validation algorithm.

#### Perspective:

New document to be produced for review by the WG11 by the end of February.

Revised and reissued for late March.

Quality review planned for April if revision and reissue goes without major comment.

Two half day presentations of EXPRESS 2nd Ed will take place on Thursday in Bad Aibling

Minutes prepared by Phil Spiby:

#### Introduction

This was the forty seventh meeting of the various working groups (WG's) of ISO TC184/SC4. Together, the WG's are working on STEP (ISO 10303), PLIB (ISO 13584) and MANDATE (ISO 15531).

#### Character sets

A number of discussions on character sets were held during the week, these covered the following areas:

Character sets in Physical file;

Compatibility between EXPRESS and SGML family of standards.

#### Character sets in Physical file

A short meeting was held to discuss the Japanese, Chinese and Korean requirements on character set encodings in part 21 files. It was announced by the Japanese delegation, who were collecting requirements, that there was no input from either China or Korea. Therefore, meeting was adjourned to Bad Aibling. If there is no input by that meeting we will proceed based on the input from Japan alone.

#### Compatibility between EXPRESS and SGML family of standards

I attended a meeting of WG3/T14 to explain the current position with respect to the communications between the EXPRESS committee and the XML developers. The current position is as follows:

EXPRESS edition 2 string data type includes any ISO/IEC 10644 UCS-4 graphic character;

EXPRESS edition 2 remarks, string literals and operator symbols may be formed using combinations of ISO/IEC UCS-4 graphic characters (with restrictions to ensure they don't coincide with the reserved words of the language). To support this an EXPRESS 2 specification will have to include encoding information. The standard will require use of UTF-8 (as defined in ISO/IEC 10646-1 Amendment 2). Other encodings are permitted, but the use of other encodings is not defined within the standard.

XML text includes characters in the following range " #x9 | #xA | #xD | [#x20-#xD7FF] | [#xE000-#xFFFD] | [#x10000-#x10FFFF]". This is a change to the proposal of August 1997, when the characters were almost identical to those chosen for EXPRESS (the only difference being that EXPRESS does not allow line-feed, carriage-return or horizontal-tab);

XML processors are required to accept both UTF-8 and UTF-16 encodings.

So there is significant alignment of the two groups with regard to the characters and their encodings, but there remains some slight discrepancies which need resolution. The members of WG3/T14 agreed to review the current Technical Corrigendum on EXPRESS which identifies the character set to be the graphic characters from UCS-4, and report to their national delegations if they feel changes should be made to bring EXPRESS in line with XML. To do this we need to extend the EXPRESS character set with the three control characters line-feed, carriage-return and horizontal-tab, and reduce it by removing characters in the range [#x0010FFFF-#x7FFFFFFF].

A clear understanding must be formed as to the exact nature of the control characters, since to use horizontal tab you must first identify the tab stops using either Tabulation align centre (TAC), Tabulation aligned leading edge (TALE), Tabulation aligned trailing edge (TATE) or Tabulation centred on character (TCC). The end of tabulation is indicated by either a Carriage return (CR) or a Next line (NEL).

This therefore implicitly requires that either the control characters for these functions are available or there is an agreement on what tab stops are expected. Similarly with Carriage return and Line feed with respect to the functions Device component select mode (DCSM) , Set line home (SLH) and Set line limit (SLL). See ISO/IEC 6429 Information technology - Control functions for coded character sets.

EXPRESS Edition two

Amongst the topics discussed during the week were the following:

Subtype/supertypes

Expressions as data types;

review comments from document N041;

EXPRESS-G.

A summary of the discussions and conclusions will be given in the next few pages.

Subtypes/supertypes

There were a number of issues arising throughout the week with regard to the subtype/supertype relationships and how these related to other new features.

Connotational subtypes

The first issue discussed was related to the connotational subtypes, and whether this concept could be extended to defined data types. The rationale for this suggestion was that the concept behind a connotational subtype is an instance based subset determination. A supertype is in the subset if it meets the criteria for that subset. Whilst it was agreed such a concept may prove to be useful for defined data types as well as entity data types it was decided to maintain the connotational subtyping for entity data types only. A number of issues were raised with regard to the effect of connotational subtypes and their relationship to built in functions and constraint mechanisms. The issues and their resolutions are presented below:

Are connotational subtypes implicitly overlapping?

It was agreed that like other subtypes, the declaration of a connotational subtype without a subtype constraint would allow overlapping connotational subtypes.

Is it possible to write a constraint for connotational subtypes?

It was agreed, after some discussion, that connotational subtypes should not be included in the specification of constraints, this includes TOTAL\_OVER, and the constraints in the current language. This is due to the fact that if we were able to write such constraints we would not be able determine which of the connotational subtypes the instance was allowed to be.

How do instances of connotational subtypes respond to functions such as TYPEOF,

EXACT\_INSTANCE\_OF etc.?

The connotational types should be included in these functions, the exact nature of which is to be defined.

Is it possible to define attributes, parameters and local variables to be of type connotational subtype?

Yes.

Is it possible to use entity constructors to instantiate a connotational subtype?

Yes.

Complex entity evaluation

The evaluated set evaluation algorithm presented in Annex B in the current manual was discussed with the following issues being raised:

1. The current algorithm has to be extended to cover multiple constraint specifications, TOTAL\_OVER constraint and connotational subtypes. This was agreed, and Don Sanderson has taken the action to rework the document in this area.
2. The current algorithm is computationally hard! It takes a significant amount of processing power (in some cases days on high end workstations) to evaluate the evaluated set for current AP's. What exactly do the end users and developers want in this area?

It was agreed that there is a wide range of expectations:

the current evaluated set algorithm, although computationally hard, is a definitive specification of what is possible and should be kept.

The usual expectation when dealing with data sets is to test a single instance for validity, this can be done if the evaluated set algorithm has been performed, but a simpler algorithm for testing a single instance should be made available. This was agreed and was deemed possible (such capability is already available in the ECCO and CIMIO tools at least). The EUG paper by Staub, Maier and Schonefeld will be used to

develop a testing algorithm. The work to develop this algorithm will be carried out by Don Sanderson, who will provide cross checking with the current algorithm to ensure consistency. Finally, from the model developers perspective, an algorithm to define what constraint should be specified given a required evaluated set would be appreciated. This was agreed as an ideal, but since the same evaluated set could be evaluated from many different constraint specifications, it was decided that this was not suitable for standardization.

3. It was agreed that Annex C, which documents how an evaluated set is transformed over a schema interface, should also be updated in line with the changes to annex B. Again to be performed by Don Sanderson.

#### Total over constraint

There was some discussion around this construct and what the effects were with regard to the ABSTRACT constraint. It was agreed that TOTAL\_OVER and ABSTRACT are independent constraints. It is possible to specify a TOTAL\_OVER constraint without specifying the supertype to be ABSTRACT. This means that instances of the supertype are allowed, so long as it is not an instance of any of its subtypes. When it is an instance of any of its subtypes then the TOTAL\_OVER constraint is applied which means that it must be an instance of at least one of the elements in each total over list for that supertype. To put this in simple terms:

ABSTRACT means: an instance must be an instance of one of my subtypes.

TOTAL\_OVER means: If an instance is an instance of a subtype then it must also be an instance of at least one of the subtypes in each TOTAL\_OVER clause specified for the supertype.

#### Expressions as data types

A number of meetings were held in this area with the aim of gathering requirements and feed back on the proposal discussed at the Florence meeting.

A requirements gathering meeting was held with WG12 Parametrics in which the Florence proposal was discussed. It was agreed that we were moving in the correct direction by allowing expressions to be passed as data types, but there was concern that we were perhaps providing too much EXPRESS control by also providing the evaluate built in function and constraining the return type of the expression. There was also concern that the current proposal did not address all their issues, in particular conditional expressions "v = IF a = 1 THEN v1 ELSE v2 END\_IF"; function and entity declarations in a physical file; physical file query language; arbitrary references in the expressions as data.

It was pointed out that most of these issues were in fact issues on the implementation form (physical file only, which is not suitable and general solutions should be sought where possible). It was agreed that the parametrics group should review the clause on expressions as data types when available. Those requirements it does not directly support will be discussed at the Bad Aibling meeting.

A feedback meeting was held with WG3/T12 Building/construction meeting providing information on where EXPRESS edition 2 was going with respect to supporting parametric capabilities. This meeting went well, one important comment was that the inclusion of expressions as data types would remove a significant number of incompatible expression data models being produced within SC4. The building/construction group also agreed to give the clause on expressions as data types a significant review when available.

The EXPRESS language project also spent one whole day discussion issues around this area. It was argued that expressions as data types was being introduced to just support the parametrics group. This was dismissed by referring to the original EXPRESS edition 2 requirements document (WG5 N229) which identified behaviour of individual instances as a requirement to support the exchange of instance specific behaviour in a number of industries. The specification of expressions as data types will support this by allowing an instance to define the trigger conditions for local events, and reaction pre and post conditions also. It was acknowledged that this requirement had been dropped in the official requirements document (WG5 N252) due to concern that it was beyond the capabilities available at that time. The fact that parametrics, geometry and P-Lib, to name but a few, were building expression models is a clear indication of the need for such capability. The rationale for it being included in the EXPRESS language is that all of these models at present are trying to build a model of the EXPRESS expression capabilities. By building this capability into the language it will be defined in the same manner as the language, also a significant



amount of implementation techniques become available to the users by re-using EXPRESS language expression parsers in the implementation forms. This enables not only syntactic checking capabilities but also reference and type checking capabilities which would cause significant problems for the developers of the expression models to define. It was finally agreed that this development should be continued, but it should be a separate conformance class to enable the implementors to decide if they wish to support it or not.

It was also argued that if we are going to make this addition to the language we should go the whole way and include the capability for adding attributes to entities, adding new entities, adding constraints (both global and local) at the implementation (physical file & SDAI) level. This was discussed and it was agreed that a generalization of this approach would be to have a "frame" based language in which other language components could be added, also including EXPRESS language components. This "frame" based approach would, it was argued, be too ambitious for the currently proposed edition of EXPRESS, and would probably delay the work by at least another year, possibly two. Therefore the group agreed to limit the extension to expressions as data types for this edition of the standard with an option of extending to a "frame" based approach in future editions of the standard. If there was sufficient interest in pursuing the "frame" based approach evident from the CD ballot comments then it may make it into this edition following a second CD.

With the above agreements on expressions as data types we investigated the other implications of including expressions as data types. The agreements we reached in this area are given below:

Operands in expression values must be visible in the scope of where they are evaluated. Therefore the following may be assumed:

Attributes may be declared as expression data types, in which case the operands are other attributes, constants and SELF (?);

parameters and local variables may not be declared as expression data types.

expression data types have no equivalent literals. It should be possible to manipulate expression values within an EXPRESS specification, therefore two functions are introduced:

string\_to\_expression (string, typename):expression;

which converts a string representation of an expression into an expression value.

expression\_to\_string(expression):string;

which converts an expression value into a string representation;

The format built-in function may be used to put literal values into a string in a manner suitable for conversion into expression values;

string concatenation may be used to build up strings which can be converted into expression values.

The following examples define what expressions may declared within an EXPRESS specification given the following declarations:

exp1 : EXPRESSION(LOGICAL) := string\_to\_expression('a = b');

exp2 : EXPRESSION(LOGICAL) := string\_to\_expression('b = a');

exp1 = exp2

allowed, will result in FALSE since the two expressions are different;

evaluate(exp1) = evaluate(exp2)

allowed, will result in TRUE the two expressions are equivalent;

exp1 AND exp2

disallowed, only =, <>, := and :<>: are valid operators for expression values.

Review comments from N041

The following comments were made with regard to the N041 document distributed prior to the meeting.

Built in functions, procedures and operators

Unary operator + (Identity function) should be kept for upward compatibility with previous version.

New function required to navigate over relationship entities:

related\_to (source: INSTANCE; association: TYPE\_NAME; source\_role: ROLE\_NAME;  
target\_role: ROLE\_NAME): BAG OF GENERIC;

Which returns all values in the target role of all instances of association where the source instance plays the role source role.

New functions required to convert to and from single characters to character codes from ISO/IEC 10646.

New function to return all index values of a table value.

indices\_of(t:TABLE OF GENERIC INDEXED BY GENERIC:ind): BAG OF UNIQUE GENERIC:ind;

New function to determine if an instance is a persistent member of the information base

is\_persistent (e:INSTANCE):BOOLEAN;

There was an issue as to whether we need a built in function (or event) which determines when access to an entity instance is requested, the information this includes should be who requested the access to the instance, and the type of access was requested. This issue will blur the distinction between where an EXPRESS specification finishes and an SDAI implementation starts. The issue is unresolved at present.

New procedures create and destroy to move entity values between being persistent or not.

New procedures drop and extend to change the type structure of an entity instance.

Revision of the like operator to work correctly with ISO/IEC 10646 character set.

Other issues

Aggregate initialization requires type information to ensure that the correct type is formed on initialization. This currently causes problems in edition 1 and needs to be corrected in the next edition.

This, if generalized, may lead to a type casting ability which would be useful in a number of situations.

The specification of precision in N041 is better than in the current edition, but the current mechanism may be too general. It was suggested that the radix be limited to either 2 or 10, since all useful precision statements are given in these forms (computational precision in base 2, scientific precision in base 10).

Language version control was noted in the syntax but is not documented in the LRM at present, this needs resolving.

The following conformance classes were identified for the next edition of the language:

1. Static EXPRESS: as current edition with improved constraint specifications;
2. Dynamic EXPRESS: Conformance class 1 plus dynamics clause;
3. Expression handling: this class is divided into:
  1. Class 1 plus expressions as data types;
  2. Class 2 plus expressions as data types.

Extensible enumeration's need further explanation, especially with regard to how they interact over schema boundaries. The understanding in the group was re-affirmed and an example was developed for inclusion in the next version of the LRM.

There was major concern about the removal of the built-in constant names from the list of reserved words. This, it was argued, will remove all trust in schemas based on these values, since if someone inadvertently shadows one of these names all users of that schema will be assuming they are using the built-in constant, when in fact they are not. It was pointed out that shadowing of a built-in name should always result in a warning message being produced, for each schema where the built-in name is shadowed. This messaging needs to be made more explicit and the document will be adjusted accordingly.

There was major concern about the definition of built-in operators now being case sensitive, which would cause confusion to virtually all current users. At present there is no resolution to this issue, but it was agreed that this should be addressed.

The DO statement should be changed to another name as it causes confusion to programmers from certain language backgrounds. Agreed, it will be changed to EXECUTE.

There was some discussion on the dynamics clause, which it was agreed required further work. As it stands at present the differences between global event and local event, and internal event and external event are explained before any explanation of what is similar between them, i.e., what an event is. This was agreed to and Phil Spiby will provide a re-worked version of the clause to Per Emanuelson for review before wider distribution.

There was a suggestion that the pre conditions, as allowed for actions and reactions, may be applicable to both functions and procedures. This would allow formal specification of the built-in functions and procedures and, more importantly, allow contract programming style to be used for user defined functions and procedures. This was agreed to, but the detail of what happens when an invocation of a function with parameters which fail the precondition was not decided.

EXPRESS-G

The changes proposed to EXPRESS-G at the Florence meeting were reviewed and the following changes were agreed to.

Total over constraint;

The total over is represented by a pair of thin parallel lines. The elements of the TOTAL\_OVER list are signified by a thin line running perpendicular to the TOTAL\_OVER constraint to the specified entity ending in an arrow head. This was not considered at Florence.

Connotational subtypes;

A connotational subtype is marked with (CON) after the entity name inside the entity box. This was not considered at Florence.

Events;

It was suggested that diamonds were difficult to use since long event names would protrude from the sides of the diamond. Therefore it was agreed that a parallelogram will be used to signify an event. The distinction between local and global was to remain, with global events being marked with thick lines and local events being marked with thin lines. The line indicating the scope of local events was changed such that the circle at the event end is now a full circle. The reaction indication was also changed to be a thin dashed line from the event to the entity, labelled with the behaviour, but with no end markers.

Conclusions

The concept of the expression data type has spread through a number of groups, with a significant number of people wanting more information and offering to review the work with a view to using the concept. This, although positive from the EXPRESS language development perspective, has to be handled with care. It is easy to perceive of people using the language too early, then being reluctant to change, if change is required to achieve a technically complete and consistent language.

This meeting was the first meeting for a significant length of time when no major issues were raised. The issues were at a detailed level, refining the documentation and the understanding. This meeting marked a turning point in the edition 2 development, the basic structure and contents of the document are agreed, the work from now on is refining the language and it's description.

It is expected that the EXPRESS edition two document should be ready for CD ballot in April 1998, with an anticipated IS document being available in 2000.

## Part 22: SDAI

Situation:

FDIS has been given to Geneva.

Discussion of this week:

Potential complements and SEDS reports

Impact of EXPRESS 2 on SDAI

static

expressions as data types

dynamic

Minutes prepared by David Price:

Meeting attendees were:

Lothar Klein, Christophe Viel, Don Sanderson, David Price.

Two possible SDAI extensions questions were discussed:

- 1) Should we make changes to Part 22 prior to EXPRESS-2?
- 2) Should we make extensions to Part 22 to support EXPRESS-X?

At the moment, the attendees have no direct requirements for SDAI changes resulting from requirements to implement EXPRESS-X or EXPRESS-2. Note that none of the EXPRESS-X project were present.

Lothar Klein discussed some general SDAI extension requirements:

- 1) Support the complete set of items from EXPRESS in the SDAI dictionary, not modelling them just as strings. Usage scenarios for this extension were:

Used to present original EXPRESS schema to a user - string is enough for that.

With a model of the EXPRESS expressions a standard interpreter could be written.  
Could support creating new entities in the dictionary, particularly in support of parametrics.

2) Domain equivalence - the question concerns the type defined in the local schema reference to the type in the other schema. The external type id is not handled as an entity but as a string. It should be modelled better.

David Price noted that there was some question in the SDAI dictionary about referring to entity types in schemas that didn't appear as instances of `schema_definition` which might have been the rationale for the current modelling.

There was also a question about how to populate the domain equivalence information in the SDAI dictionary and answering the related question in the PICS.

The PICS should list possibilities listed in the annex in Part 22 and then allow others.

3) Consider all the Part 21 header entities for possible extensions to SDAI data organization entities.

4) SDAI data parameter schema was confusing, the `session_instance` vs. `Session` entity for example. This is an editorial question really.

Don Sanderson discussed EXPRESS-2 capabilities and we attempted to identify areas of impact:

EXPRESS-2 conformance classes expected:

CC1: EXPRESS 1 plus all static except expression, no dynamics.

CC2 : CC1 plus dynamics, no expressions

CC3A: CC1 plus expressions, no dynamics

CC3B: everything in EXPRESS-2

They are talking about two meta-models in the standard:

1) an exchange model including EXPRESS-G and

2) a semantic model.

Should consider whether 1) could be exactly or be the basis for the SDAI dictionary model.

EXPRESS-2 CC1 STATIC definitions:

1) SET becomes BAG OF UNIQUE

Might affect the mapping of EXPRESS into the data dictionary.

2) Supertype constraints separate now

Definite affect on data dictionary.

3) New connotational subtype

Definite affect on data dictionary. "Subtype" based on rules, not structure.

Could affect the operations like is exact instance of. Subtype data structure cannot add any attributes.

4) TOTAL OVER supertype constraint

Definite affect on data dictionary.

5) Character sets have expanded greatly (not exactly Unicode V2 but 10646 and UTF-8. Using UTF-16 would make it exactly the same as Unicode V2 which XML has done). May consider doing this in the future.

Affect on the implementation of all STRINGS.

6) Tags in remarks

No SDAI impact except on parsers or a complete meta-model.

7) Built-in constants, etc. are not reserved keywords

- SDAI would have to reference this for `express_id` type.
- 8) Binary data type: removed comparison operations.  
No SDAI spec impact, impact is on implementations.
  - 9) Complex number type added.  
SDAI dictionary and operations are affected.
  - 10) Number data type is removed.  
SDAI dictionary impact - minimal.
  - 11) Precision on real and complex and therefore on integer but assumed infinite.  
Minimal Part 22 impact, impact on implementations.
  - 12) New ALIAS concept with no specialization, like typedef  
SDAI dictionary impact, some operations impact.
  - 13) Extensible SELECT and ENUMERATION  
SDAI dictionary impact. Operations impact.
  - 14) New data type : "type name" that is returned from the `typeof` function.  
Dictionary and operations impact.
  - 15) Expression as a type, for parametrics. Added "evaluate" as an function.  
Dictionary and large potential impact on operations.
  - 16) New built-in, etc, other.  
Impact on implementations but not SDAI spec unless we have meta-model of EXPRESS in the dictionary.
  - 17) Schema defined operators  
Impact on dictionary and operations.
  - 18) Tables aggregate type  
Impact on dictionary and operations.
  - 19) Version control for schema names.  
Impact on dictionary, interface spec, etc.
  - 20) Express version identifier in a comment as the first token in an EXPRESS-2 file.  
Impact on parser.

EXPRESS-2 dynamics:

Supporting dynamics from EXPRESS-2 will require quite a development. This could lead to the idea that this might not be an extension to Part 22 but a New Part which extended Part 22 rather than Conformance class in Part 22.

It was noted that there is a "process modelling/procedural" set of capabilities and an "object oriented" set of capabilities. Both can be used together.

What about SDAI implementations that support BOTH EXPRESS 1994 and EXPRESS-2? Are there possible impacts on SDAI?

Part 23: C++ language binding

Situation:

No activity this week

DIS ballot will close March 23, 98.

Perspective:

Review DIS ballot comments in Bad Aibling

Part 24: C language binding

Situation:

No activity this week.

Document has been sent to the editor for review.

Perspective:

DIS ready for qualification in June.

Part 26: IDL language binding

Situation:

Resolved CD ballot comments in Florence.

DIS preparation is in progress.

Perspective:

Prepare DIS vote.

Part 32: Requ. on Test. Labs. & Clients

Situation:

FDIS has been sent to ISO in Geneva.

Perspective:

Check FDIS ballot results in Bad Aibling.

Part 34: Abstract test methods for AP implementations.

Situation:

DIS is ready for qualification.

Perspective:

Wait for DIS ballot to start.

Part 35: Abstract Test Methods for SDAI

Situation:

No activity this week.

Activity to restart this month.

Objectives:

Write more example of abstract test cases with associated executable test case.

Identify which error response and EXPRESS constructs are meaningful for testing.

Solicit contribution on the exploder: pt35@cme.nist.gov.

WG11 in Bad Aibling (tentative agenda)

WG11 plenary meeting: Monday 10:30 to 12:00 and Thursday 8:00 to 9:00.

Discussion of XML with WG3T14 on WG11 plenary Monday morning

National character set: (to be confirmed by Mr Oku) Monday 13:00 to 17:00.

EXPRESS X: Monday 13:00 to 17:00, Tuesday 8:00 to 17:00, Wednesday 10:30 to 17:00, Thursday 9:00 to 17:00 and Friday 8:00 to 17:00.

Java binding: with part 23.

Part 21 extensions: tuesday 13:00 to 17:00.

Part 11 2nd ed: Tuesday 8:00 to 17:00, Wednesday 10:30 to 17:00.

General presentation of EXPRESS 2

session 1: Thursday 8:00 to 12:00.

session 2: Thursday 13:00 to 17:00.

Part 22: no room requested.

Part 23: Monday 13:00 to 17:00, Tuesday 8:00 to 17:00, Wednesday 10:30 to 17:00.

Part 24: no room request.

Part 26: with part 23.

Part 32: Wednesday 10:30 to 12:00.

Part 34: no room requested.

Part 35: Wednesday 13:00 to 17:00.

Minutes Submitted by Christophe Viel, WG11 Convener

## **Part 21 Stage 0 Planning Project**

**Attendees:** David Price, John Valois, Martin Hardwick, Lothar Klein, D. Arnault, Christophe Viel, David Campbell, Rick Kramer, Praful Patel, Hiroshi Kodaka

The progress to date and minutes from the Florence meeting were reviewed and the requirements summary was also reviewed. Several new potential requirements were raised:

38) Support using Part 21 files as an SDAI repository. This includes at least support for the following mapping:

- Part 21 file as SDAI repository
- Part 21 data section as SDAI-model
- Adding the SDAI schema instance concept to Part 21
- Allowing references between data sections and Part 21 files

39) Support Part 21 as an exchange mechanism between SDAI implementations maintaining the SDAI data organization.

40) Allow ENTITY definition in a file : for example the definition of the user defined entity.

41) Reference to entity-attribute from an entity. EXPRESS does not support this either.

42) Version of schema in file.

43) No allowed external references (e.g. everything must always be in one file)

As this was the fourth SC4 meeting at which the project met it was felt that sufficient opportunity for requirements input had been provided and a proposal should be made back to WG11 for potential for specific new work items. The team then reviewed the complete list of requirements and developed the following proposals:

NWI : Produce Part 21 Amendment as planned to address character sets

NWI : Produce Part 21 Second Edition including TC, character sets and limited additional capability

NWI : Produce Part 21 Third Edition along with EXPRESS-2

Part 21 Edition 2 Scope Proposal:

Agreed to scope

- Same short name capability for entities, defined types and enumeration item names (8)
- AP Interoperability (proposing multiple data sections) (6 as in 10,10,27,43)
- AP CC, or other standard subset, in Header (35, 42)
- Default language in Header (11)
- P21 itself upward compatible (16,17,21,34)
- Remove require all external mapping conformance class (37)
- Either provide useful semantics for or remove SCOPE construct (36)

Issues for WG11 plenary consideration

- Support Part 21 as exchange between SDAI implementations (39)
- Support Part 21 as an SDAI Repository (38)

NOTE: At the WG11 plenary later in the week it was decided to propose deferring these requirements to future editions of Part 21.

Part 21 Edition 2 Out-of-Scope Proposal

Defer all other new capability to be potential Part 21 Edition 3 for EXPRESS-2 support.

An incomplete list includes:

- Parametrics (7,20,22,23,24,25,26,40)
- Cross-file references, file changes, multiple files or other file types (3,9,28,29,30,32,33)

- "Delta files" or "actions on objects" (2,4,5,15,18)
- Others : (1,12,13,14,19,31,41)

Martina Hardwick offered resources to help create a draft Part 21.

Additionally, at the WG11 plenary later in the week the progress of the Part 21 Character Set capability was discussed and at the moment it appears that the non-character set extensions proposal may be completed prior to the character set extensions. Therefore, we may propose that the character set changes be proposed the later new edition NWI and the requirements discussed at this meeting be the NWI an amendment to Part 21.

Minutes submitted by David Price

## **Joint Express-2/SDAI Extensions**

**Attendees:** Lothar Klein, Christophe Viel, Don Sanderson, David Price.

Two possible SDAI extensions questions were discussed:

- 1) Should we make changes to Part 22 prior to EXPRESS-2?
- 2) Should we make extensions to Part 22 to support EXPRESS-X?

At the moment, the attendees have no direct requirements for SDAI changes resulting from requirements to implement EXPRESS-X or EXPRESS-2. Note that none of the EXPRESS-X project were present.

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Definite affect on data dictionary. "Subtype" based on rules, not structure.  
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It was noted that there is a "process modelling/procedural" set of capabilities and an "object oriented" set of capabilities. Both can be used together.

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Minutes submitted by David Price

## **WG12: SC4 COMMON RESOURCES**

### **WG2, WG12, and QC Joint Meeting**

#### **Agenda:**

1. Procedures for Application Interpretation document
2. Expressions as a Common Resource

#### **Procedures for Application Interpretation**

Three action items were to be completed prior to this meeting:

1. Geunter Staub was to provide input relative to use of PLIB was STEP,
2. Robert Swindells was to provide input relative to consistent interpretation of materials in STEP,
3. Rob Howard was to provide figures for the document.

Action Item 1 was completed and would be used as an annex to the document

Robert Swindells was not able to attend the meeting. Action Item 2 was not completed and the WG12 Convener would follow up relative to the status of this item.

Rob Howard was not able to attend the meeting. Action Item 2 was not completed and the QC Convener would follow up relative to the status of this item.

Consensus was obtained that the need for this document was near term and that the modularization of the SC4 standards would alleviate the need for this document in the future. This document would be used as corporate history. It was agreed that this document should become a SC4 standing document. The schedule for incorporate of inputs is as follows:

- 1998/03/31 - Input to Linas Politikias on current document
- 1998/05/01 - Linas to provide document for review at Bad Aibling
- Bad Aibling Monday afternoon Joint WG12 and QC for discussion of document.
- 1998/07 - Document ready for review outside of WG2, WG12, and QC

A long term goal would be that every interpretation would provide input to the document and the that document would be a living document to capture these interpretations. AP 208 and AP 217 used this document as input, but did not provide any feedback, examples, or items that need additional effort. It was identified that with the modularization approach of ISO 10303, the modules would capture the interpretation.

AP 218 and AP 230 would utilize the document in the next six months and should be requested to provide input to the document and the review of the document for improvement. AP 221 and AP 227 would utilize the document in the near future for consistent interpretation of PLIB in the ISO 10303 standard.

Several areas were identified as requiring additional information for consistent interpretation:

- connectivity
- general external interfaces
- PLIB
- properties
- connections
- functional vs physical product information
- specific vs typical product information

### **Expressions as a Common Resource**

PLIB Part 20 was viewed as a common resource that should be in WG12 when it reaches IS by all present. It is IS soon. The WG12 Convener took this as an action item to discuss in WG12

PLIB Part 42 - dictionary was also viewed as a common resource that should be in WG12 when it reaches IS by PLIB. It is IS soon. The WG12 Convener has not reviewed the document sufficiently to recommend a position at this time. This document has links to IEC work. The WG12 Convener took this as an action item to discuss in WG12.

Two other parts were PLIB Part 24 and Part 26 (Supplier identification) discussed as possible candidates for WG12. These needed additional review. A meeting in Bad Aibling would be set up for this.

Other technical issues were identified for further effort in interoperation of STEP and PLIB:

- long names
- short names
- Referencing between standards
- Referencing for EXPRESSIONS in STEP

A September workshop may be needed

### **NWI/CD ISO 10303-41/43/44**

Meeting was brought to order and the Agenda was revised to the following:

- Project Leader Summary
  - Number of Ballot Comments
  - Number/Extent/Type of Technical Comments
- SC4 Secretariat General Guidance
  - General Approach to Resolution
  - Ballot Comment Turnaround Time
  - New ISO Part 3 Impact (QC N044)
  - Ballot Comment/Resolution Format
- 23-27 March Workshop Organization
  - PL/Editors with classification of comments
  - Participants
- Bad Aibling Meeting Time?
- PL - Part Schedule
  - DIS - 98/07/01
  - FDIS - 99/04/01
  - IS - 99/09/01
- QC Resource Tax
- SEDS Report for ISO 10303-44

The discussion is per the following topical area:

### **Project Leader Summary**

The project leaders summarized the inputs from the day as follows:

10303-41 (Glen Ziolk) 232 Comments 30% Technical  
10303-43 (Julian Fowler) 32 Comments Majority Editorial  
10303-44 (Mitch Gilbert) 110 Comments Majority Editorial

The project leaders were thankful for the comments received and the clarification and review provided by the respective individuals and countries.

#### **SC4 Secretariat General Guidance**

The SC4 Secretary (Lisa Phillips) reviewed the procedures for resolution of ballot comments and a discussion relative to scope issues was addressed. Due to the general nature of the respective parts, it was believed that most comments would be extensions of existing concepts within the scope of the respective parts. If a ballot comment relative to an extension of scope of the part arose, then the ballot comment would be addressed in the workshop (23-27 March Ballot Resolution Workshop) while the SC4 Secretary was there. In many respects the extension of scope is subjective due to the general nature of the respective parts.

The SC4 Secretariat reviewed the format for submission of ballot comments from the countries and stated that ballot comments that were not in the respective format would be returned to the respective country. The SC4 Secretariat identified what the Project Leader/Editors/Ballot Resolution Team would be required to complete on the ballot comment workshops. The completed ballot comment sheets would have to be returned when the parts were submitted for the next round of balloting.

The SC4 Secretariat stated that a two week turnaround time (or less) would be possible from the submission by the SC4 countries to the WG12 Convener, IF THE COMMENTS WRE SUBMITTED DIGITALLY. It was requested that the digital format be either ASCII or MS Word '95. The WG12 Convener would forward the comments to the Project Leader/Editors/Ballot Resolution Team through the WG12 Exploder.

Julian Fowler summarized the impact of the new ISO Part 3 Directives. QC was developing a modification to the Supplemental Directives to incorporate the new ISO Part 3 Directives and it would be available later in the week. Julian believed that the changes were a very minimal impact to the Editors. In most cases, it would take less than one hour for each part. Julian took an Action Item to forward the new document when it was available.

#### **23-27 March Ballot Workshop Organization**

The Project Leader/Editors/Ballot Resolution Team would attempt to classify the comments to areas that could be logically addressed together prior to the Workshop. The Workshop will start at 8:00 on Monday and run through noon on Friday. Monday afternoon, all day Tuesday, and Wednesday morning facilities would be made available for the Project Teams to meet separately. The other meeting times would be planned as Plenary sessions.

The WG12 Convener agreed to take an action item to ensure that QC was available for a conference call on Thursday and Friday, if QC related issues arose.

The personnel present were asked to make sure that the host, SCRA, was made aware of the personnel that were coming. This would ensure that sufficient facilities were made available.

#### **Bad Aibling Meeting Time**

For meeting space in Bad Aibling, it was determined that the WG12 Convener and the QC Deputy meeting space would be sufficient for side meetings.

#### **PL - Part Schedule**

The following schedule was proposed and agreed to by the Project Leaders/Editors. This was an aggressive schedule, but was obtainable considering the current number and extent of the known ballot comments.

DIS - 98/07/01  
FDIS - 99/04/01  
IS - 99/09/01

The Technical Corrigendum against the SC4 FDIS and IS parts was briefly discussed and the potential impact of this to the these efforts. Considering the time scale, it was determined that little if any effect

would occur. The Technical Corrigendum would affect AP 210 and 225, as a minimum. Further discussion was deferred until tomorrow in WG12 Plenary.

It was recommended that the efforts on ISO/CD 10303-42 be expedited so that all of the parts could progress at the same time. The current timing is that 42 is several months behind 41/43/44, but that 42 would be in the ballot cycle soon and could potentially catch up if the above schedule slipped at all.

#### **QC Resource Tax**

The QC Resource Tax was discussed and how this personnel tax could slow the progress of the parts through the process. The Project Leaders for 43 and 44 stated that they could not supply personnel to satisfy this tax. The WG12 Convener would work with ProSTEP and PDES, Inc. to resolve this issue.

#### **SEDS Report for ISO 10303-44**

During the process of the SEDS database cleanup, the WG12 Convener identified an additional SEDS issue against Part 44. SEDS 243 was identified in the SEDS database against ISO 10303-203, but was applicable against ISO 10303-44. The Project Leader for 44 has reviewed the issue and stated that it was a valid issue and would be against rules in the EXPRESS. All in attendance agreed that this issue should be rolled into the other SEDS issues that were to be submitted from the SC4 Secretariat (as per the other open SEDS issues).

#### **Plenary at ISO TC184/SC4 Meeting**

**Participants:** Bill Anderson, PDES, Inc; Michael Endres, ProSTEP; P. Huau, GOSET; M. Gilbert, PDIT; R. Goult, LMR systems; B. Gruttke, Northrop Grumman; J. Haenish, Det Norske Veritas; T. Kishinami, Hokkaido University; K. Kobayashi, Toyama University; C. Kouchie, J-STEP; P. Kraushar, Boeing; E. Lebeque, ESPRI Concept; H. Mason, British Aerospace; J. Mohrmann, debis; G. Paul, Lockheed Martin; M. Philipp, DiK; L. Polikaitis, ITI; M. Pratt, NIST, P. du Rivault, GALIA; G. Staub, RPK; T. Tanaka, Nissan, M. Ungerer, ProSTEP; B. Wenzel, EuroSTEP; G. Ziolkowski, Northrop Grumman

#### **1. Agenda:**

- |   |                                    |
|---|------------------------------------|
| 1. Agenda   | Greg Paul                          |
| 2. Approval of minutes                              | Greg Paul                          |
| 3. Status of WG12 projects                          |                                    |
| – 10303-42  | Ray Goult                          |
| – 10303-41, -43, -44                                | G. Ziolkowski/J. Fowler/M. Gilbert |
| – AICs  |                                    |
| 4. Technical Corrigendum (TC)                       |                                    |
| 5. SEDS   |                                    |
| 6. AIC coordination efforts                         | Martin Philipp                     |
| 7. WG12 Short & Long Term issues                    |                                    |
| 8. Parametrics                                      |                                    |
| 9. Liaison TC213                                    |                                    |
| 10. Design and modeling applications council (DMAC) |                                    |

- . Issue discussion
  - . SC4 Action item
11. Duplicate definitions in SC4 standards
  12. Organization of WG12 work
  13. PLIB as common resources
  14. Agenda for Bad Aibling
- List of action items

## **2. Approval of minutes:**

The minutes of the WG12 meeting in Florence in October 1997 (document WG12 N136) were approved.

## **3. Status of WG12 projects:**

The project leaders gave an update on the WG12 projects as follows:

### Part 42:

Ray Goult reported that the preliminary CD document for the revision of part 42 is currently under QC review. He expects that the final CD document will be sent to NIST by mid of March 1998.

### Part 41, 43, 44:

At the ISO meeting in Orlando it was intended to get an overview on the issues that are to be expected on the NWI/CD documents of the revised parts 41, 43, and 44. Since the ballots close at February 27th, 1998 the issues reviewed are still to be considered unofficial. The official national comments will be returned by the SC4 secretariat about 2 weeks after the closure of the ballots. Subsequently there is a WG12 workshop scheduled for the resolution of all open issues at SCRA in Charleston (South Carolina) March 23rd to 27th, 1998. Details have been sent to the SC4 Exploder.

For the revision of part 41 Glen Ziolk reported that there was a review of the preliminary issues where almost 30% of the issues were determined to be of technical nature. On part 43, Julian Fowler reported that approximately 25 issues provided by France, Germany, Sweden, and the US were reviewed. According to Mitch Gilbert, some issues on part 44 have to be redirected to other parts or Application Protocols respectively. The redirected issues would probably not be submitted by the national bodies.

The discussion on further procedure for changes to the parts was determined to be a concern that WG12 will discuss the same issues at the workshop in March as at the last workshop on the three parts in Washington July 1998. Especially the issue on upward compatibility seemed to be raised again. The WG12 members required directives how to deal with this kind of issues in order to avoid further delays. Two actions were required:

- The Change Management Group was addressed to discuss this issue
- Michael Endres was tasked to summarize previous decisions of SC4 and WG12 on the issue of upward compatibility. Michael to address the Change Management and SC4 direction for the workshop.

### Other WG12 documents:

Greg Paul summarized the status of further WG12 documents:

- Part 49 moved to IS
- Part 45 FDIS closes this week
- AICs:
  - DIS versions of 501, 502, 503, 510 submitted to NIST
  - Ballots close for 504, 505, 507, 508 on March 18
  - CD2 of 509 expected by Convener in March
  - DIS versions of 511, 512, 514, 515 at QC
  - Review of CD2 ballots for 513
  - CD2 ballot started for 517
  - Preparation of CD2 of 518, QC version expected in April
  - Preparation of DIS versions of 519, 520

#### **4. Technical Corrigendum (TC)**

A problem was raised connected to the rework of IS resource parts: Application protocols identified EXPRESS defects in IS and DIS resource parts. The problem is how to deal with the error in case where the resource part is currently reworked. Greg Paul proposed the following process:

- The error needs to be identified, i.e., analysis whether the error is a tool or an EXPRESS schema problem or of unknown nature
- In case of the unknown nature, WG11 is addressed for clarification
- Review of a resulting TC needs to be reviewed in any case by WG11 and WG12 for impact
- The TC shall be incorporated directly into documents below FDIS status
- The TC shall be published for documents at FDIS and higher

Up to now, PPC and SC4 have been notified on the problem and WG11 expressed willingness to cooperate.

#### Discussion/ actions:

The overall plan was approved by those present. The problem was especially discussed in the context of the rework of the parts 41, 43, and 44. The SEDS process is currently closed for these parts, because of the NWI/CD ballot where all issues are expected to be submitted as ballot comments. The SEDS process will reopen after the ballots close. A TC on EXPRESS errors would be too time critical to wait for incorporation into the reworked parts. The publication of the TC in parallel is imperative.

The following actions were required:

- Discussion of the problem with Change Management
- Clarification of the TC format by WG12 Convener and QC
- Draft of a letter by WG12 Convener for broad distribution on identification of EXPRESS defects within 2 weeks

#### **5. SEDS status:**

Greg Paul notified that Len Slovensky will continue as coordinator of SEDS reports on part 47. He did a short review of the currently open SEDS. He announced that the distribution of statistics on open SEDS reports on ISO 10303 parts would occur in the near term. With regard to part 46 many SEDS reports were already issued. Max Ungerer stated that the SEDS reports require minor enhancements, so that a rework of part 46 seems to be not necessary at this time. In general, the consequences of SEDS reports for the further procedure of parts needs to be discussed with Change Management.



## **6. AIC coordination efforts:**

Martin Philipp gave an overview on the dependencies of Application Protocols and AICs (slides are available on the ftp-server of the DiK and will be sent to the WG3 and WG12 exploder).

It was reported that there was an issue on AIC 512 faceted brep for restriction to triangular faceted breps. For this requirement the options of defining a new AIC and/or not using the unrestricted AIC 512 were proposed as a resolution.

## **7. WG12 issues:**

Greg Paul updated the WG12 issues:

- short term issues
  - WG3&WG12 relationship
  - interpretation procedure document
  - schedule: comments to Linas Polikaitis by March 1998 and publication mid 1998
  - open SEDS issues
  - parametrics
  - MANDATE common resources
- long term issues
  - data architecture
  - P/NWI fit into SC4 structure
  - change management
  - other ISO standards

No further changes were requested. These set of issues keeps the WG focused on the near term and the longer term issues and their impact. The convener will continue to update every meeting.

## **8. Parametrics:**

Greg Paul reported that at the last SC4 meeting in Florence WG12 was tasked to work with parametrics project to identify how its deliverables are to be delivered as ISO 10303 parts by February 28, 1998 (SC4 action items of Florence #33, #34, #35). These action items were defined with regard to the SC4 resolution #350 (Numbering Designation of the Parametrics Efforts): "SC4 directs the parametrics team to number any proposed standards that result from this work as parts of ISO 10303. The 14959 designation shall be retired/recycled."

Mike Pratt stated that the interpretation of the SC4 resolution is not clear. The term recycle seems to offer an option for further use of the 14959 designation for parametrics.

Mike Pratt reviewed the status of parametrics: There are two documents available WG12 N022 and ISO/WD14959. The ISO/WD14959 where scope and fundamental concepts of parametrics are defined may fit into 1-series of ISO10303. As a result of the short term parametrics (STP), two resources could be developed: One resource on capabilities for parametrization and constraints in explicit Brep models. Another resource on capabilities for history-based or procedural modeling. The separation of the two resources was planned due to the fact that the first resource could be completed pretty soon whereas the second resource covering a constructional functions schema that will be much bigger than PLIB Part 31 cannot be completed in short term.

Discussion/recommendations:

There was a discussion on how many new documents are needed for the incorporation of parametrics in ISO 10303. As a consequence, the question was raised how many NWI ballots are needed or if it is simply possible to change the existing one.

For the parametrics team it was recommended to review the SC4 parts where concepts for parametrics are already defined, e.g.:

- Expressions are already defined in PLIB part 20, STEP parts 41 and 42.
- Intelligent strings are defined in EXPRESS V2 plus implementation forms.
- Attribute access is provided by HYTIME, EXPRESS-I (ISO 10303 TR2), and a proposal from Guy Pierra.
- Form Features concepts are defined in AP214.

The further procedure on parametrics should even take into consideration that further requirements may be incorporated in parts that are already well advanced in the standardization process.

There was a controversial discussion on the proposal of Dick Wittenom to keep ISO14959 alive as his funding is linked to it. He intends to prepare a document for the generic case parametrics (GCP) as a TR type 2. There was no agreement on this proposal.

#### Decisions:

The following decisions were made:

- ISO 14959-1 shall be migrated to ISO 10303-1 and other introductory remarks of other documents
- The parametric framework (WG12 N022) will be moved to parts 50, 51, and 52. For this migration a NWI and a PWI will be necessary.
- Since there was no agreement on the TR type 2 under the umbrella of ISO 14959 the documents on GCP will be circulated on the parametrics and WG12 exploder for feedback.
- PPC will be briefed on the results later in the week and final results included as part of the plan.

#### **9. Liaison TC213:**

Greg Paul reported that TC213 raised requirements for STEP with regard to geometric dimensioning and tolerancing. The materials need to be reviewed. The following tasks were defined:

- Greg Paul was asked to send Len Slovensky's documentation on TC213 requirements that were not met by part 47 to Pascal Huau for review.
- Mike Pratt will review the requirements considering the parametrics approach to constraints on geometry.

#### **10. Design and modeling applications council (DMAC):**

SC4 defined an action item on the review of DMAC efforts and the comment on impact on WG12 (convenors action item #17). DMAC is a council of CA vendors for improving the interoperability of software in the mechanical applications through OLE extensions. The aim of the activity is to deliver direct access to native CAD models without translation. Documents are available for compound model 1.0 (activation and display) and for geometry and topology 1.0 (access). The convener gave a short presentation on the concept (WG12 N163).

#### Discussions/actions:

The full impact of the DMAC activities is currently unknown. The scope covers part 42 and probably parametrics. Philip Kraushaar and Ray Goult volunteered to review the material with regard to consistency with part 42. Further input will be received from Mike Pratt. It appears that it does not impact the efforts of WG12, but could impact other areas of SC4. After further review of material, the action item will be dispositioned in Bad Aibling.

#### **11. Duplicate definitions in SC4 standards:**

Greg Paul reviewed the status on the discussion of duplicate definitions in SC4 standards. He provided a documentation on this issue. A parallel discussion in PPC on this matter is ongoing.

#### **12. Organization of WG12 work:**

No issues and/or suggestions on the organization of the WG12 work were raised.

#### **13. PLIB as common resource:**

Greg Paul raised the questions, whether there are parts of PLIB and Mandate designed for global use within SC4 and what efforts will be necessary to generalize the parts. Candidates within PLIB are

- PLIB 20 (FDIS): Expressions.
- PLIB 42 (FDIS): Dictionary (replication of IEC 61360)
- PLIB 26 (DIS): Supplier identification (usage guide ISO 6523 identifier coding).

#### Discussions/actions:

PLIB 20 does have global applicability and would be a good fit for a 'Common Resource'. This will be further discussed with WG2.

PLIB 26 is needed for the unique identification of suppliers. This part is more of a usage guide and may need to be generalized. This part may need to be updated to a newer version of ISO 6523 that is at DIS. The current version of ISO 6523 was published in 84. Convener to review.

PLIB 42 is too restricted on PLIB purposes. It needs to be generalized for global applicability as SC4 standard.

#### **5. WG12 planning:**

The following activities were planned and confirmed:

- WG12 ballot comment resolution workshop on NWI/CD 41, 43, and 44 at SCRA in Charleston (S.C.), March 23 to 27, 1998
- WG12 meeting at the ISO meeting in Bad Aibling (Germany) in June 1998

Monday, June 8: Joint QC and WG12

Tuesday, June 9: Project leaders to work NWI/CD 41, 43, 44 in parallel

Wednesday, June 10: WG12 plenary

topics:	project status
	parametrics
	DMAC
	PLIB
	Technical Corrigendum
	module overview and status (WG10 input)
	outcome of WG3 open forum

The WG3 proposal on a forum for general topics was discussed. The requirement for that forum is based on the need for discussions not restricted to WGs, e.g. the module discussion. WG12 proposed to plan for attendance at the forum in Bad Aibling on Tuesday, June 9. WG 3 is the facilitator for the forum.:

**List of action items:**

- |   |                               |
|---|-------------------------------|
| - discuss guidance for WG12 workshop with Change Management Group         | Convener                      |
| - summarize previous SC4, WG12 decisions on upward compatibility          | Michael Endres                |
| - discussion of the TC problem with Change Management                     | Convener                      |
| - clarification of the TC format on EXPRESS defects                       | Convener/QC                   |
| - draft of a "Call for TC" letter on identification of EXPRESS defects    | Convener                      |
| - distribution of statistics on open ISO10303 SEDS reports                | Convener                      |
| - discussion of consequences of SEDS reports with Change Management       | Convener                      |
| - distribution of slides on dependencies of AP and AIC parts              | Martin Philipp                |
| - comments on interpretation procedure document to Linas Polikaitis       | all                           |
| - publication of interpretation procedure document by mid 1998            | Linas Polikaitis              |
| - distribute proposed ISO 14959 document on exploders                     | Mike Pratt                    |
| - send TC213 open issues on part 47 to Pascal Huau for review<br>Huau     | G. Paul / P.                  |
| - review TC213 requirements with regard to parametrics                    | Mike Pratt                    |
| - review DMAC documents with regard to part 42 and parametrics<br>Pratt   | P. Kraushaar /<br>R. Goult /M |
| - notify SCRA of attendance at ISO 10303-41/43/44 Workshop                | all                           |
| - PLIB 26 review for 'Common Resource'                                    | convener                      |
| - QC Resource Tax for 40 series parts<br>convener/consortia               |                               |
| - Input relative to consistent interpretation of materials in STEP        | Robert Swindells              |
| - Rob Howard was to provide figures for the Interpretation Procedures doc | QC convener.                  |

**WG12 SHAPE REPRESENTATION (with WG3/T1)**

**Attendees:** The following participated in more than one session of the committee, others participated during the week, particularly in some of the joint meetings.

Bill Anderson, Bill Cain, Kazuya Kobayashi, Philip Kraushar, Venkatraman Kalyanapsoptny, Peter Wilson, Ray Goult,

At the start of the meeting on Monday the provisional agenda for the week was reviewed and approved. Minutes for the previous meeting had been distributed by email and were accepted. The DIS draft WG12 N145 of part 42 version 2 had been distributed by email was available to participants. This document had been with QC since the beginning of December and it was hoped that the WC review would soon be completed.

The meeting began with a joint meeting with WG12 Parametrics. This began with a report on the current status of part 42 and an estimate (late March) of the earliest date when the CD ballot might begin. Mike Pratt then gave an update report on the intended future strategy for Parametrics. He reported that most of the activity in this area since the last meeting had been political rather than technical. A decision from WG12 on the future distribution of the work was needed by the end of the month. He said that the documents to be considered were 14959-1 Overview (Dick Wittenoom), which was largely concerned with the 'long term' parametrics work and a draft of the 'short term' Parametrics Framework' document which now included the geometric constraint schema. He suggested that the framework document was compatible with ISO 10303 and logically could be considered as one or more parts in the 40 series. The future of part 1 was more questionable, possibilities included its publication, as originally intended as part 1 of ISO 14959 (depending upon the interpretation of the word 'recycle' in the Florence SC4 motion relating to this series of documents); the incorporation of this document in part 1 of STEP; or the redistribution of the material from this document. After some discussion it was agreed that the best solution was to incorporate, if necessary, some basic definitions in a revision of 10303-1 and to include other material as introductory material in the new resource parts being proposed. It was reported that Dick Wittenoom was submitting an expanded document giving requirements for long term parametrics for publication as a type II technical report in the 14959 series. Mike Pratt suggested that as resource parts the frameworks document should be published as 3 separate documents. The first of these would be concerned with parameterized models and geometric constraints of explicit B-rep models. This could be published quite quickly once the expressions issue had been resolved, potential solutions for this might be found in the revised part 41, new part 42, PLIB part 20 or in EXPRESS version 2 when available. He said that the other resource documents were on a longer timescale and would be concerned with history based parametric models and the specification of an applications interface to such models. Noel Christensen gave a simple example of how the procedural modelling could use existing part 42 constructs but with a requirement to mix 2D and 3D geometric definitions in addition to new entities to be defined in a parametrics schema.

Bill Anderson confirmed that as part of the PDES Inc. work on modular extensions to AP 203 he would be developing a parametrics module based upon the work of the ENGEN project. He said that they were considering using PLIB part 20 for the description of expressions and that pilot implementations were planned by the end of May. He promised an update report of this work at the joint meeting in Bad Aibling.

The DMAC proposed 'standard' for windows based systems was discussed briefly. Mike Pratt said that this seemed to be largely compatible with part 42 and provided a unidirectional query interface to some parametric modelling capabilities. It was agreed to investigate this further for discussion in Bad Aibling.

New SEDS issues received since the Florence meeting were 297, 298, 299 and 301. Copies of these issues and related correspondence were distributed to the committee. The meeting of the committee itself began with a review of these issues. Resolutions to issues 297 and 298 had been incorporated in the N145 version of the document and these were endorsed by the committee. After reviewing SEDS 299 the committee agreed that this was based upon a misinterpretation of the descriptive text of the composite curve on surface entity, a minor modification to the text in N145 was suggested as a resolution of this

issue. SEDS 301 raised a number of interesting questions relating to Euler formulae and the use of oriented edges in the construction of edge loops. There was no consensus in the committee on whether, or not, the use of two opposite oriented edges to bound a complete spherical face should be legitimate. It was, however, agreed that the use of a single vertex loop was to be preferred. The inconsistent use of edges or 'logical edges' in the Euler formulae in the various topological entity definitions was noted during further discussions of this issue later in the week. It was agreed that this issue should properly be addressed as part of the CD ballot resolution process. As part of this process the use consistently throughout the document of EITHER the edge count, OR the oriented edge count should be considered.

The second day of the meeting began with a joint session with WG3/T9 Engineering Analysis. This began a presentation of the discussion paper WG3 N159 on the use of mathematical representation in engineering analysis. The presentation concentrated upon the interaction between entities from the engineering analysis description of property and numeric object UoFs (now being developed into modules) and the math functions and math spaces from mathematical representation schema from part 42. The relationship is that the constructs from the mathematical representation schema are purely numerical and the homomorphic description and homomorphism entities from the engineering analysis model provide the necessary context information, include units, coordinate systems and identification of the properties being described

by the mathematical function. This enables the identification of points in a multi-dimensional space with property values. After the presentation Keith Hunten suggested that for some users the constructs were rather abstract and that there might be a requirement for a specific ARM level model targeted at a particular application area to make the core model more accessible to users. He suggested that it would be a very useful exercise to produce an example to show how some of the mathematical representation constructs could be used in conjunction with some constructs from AP 209. David Leal said that the description of property module was capable of representing both the FEA analysis results from AP 209 and more general varying properties using the mathematical representation constructs. Phil Kraushar announced that a new version of the DT-NURBS package would include a complete implementation in C++ of the mathematical representation schema.

In the Tuesday afternoon session Professor Kishinami presented two papers WG12 N164 and WG12 N165. In these papers he described some of the data exchange requirements between CAD systems and Rapid Prototyping systems, particularly those using laser lithography technology and the current STL file specification. He suggested that in the long term AP203, particularly CC5 (faceted B-rep) and CC6 (advanced B-rep) could replace the sTL specification as an interface to RP systems. He said that RP systems worked with slices of a triangulated solid model and in N164 he proposed an amendment to AIC 512 to support a more restricted form of faceted B-rep. The requirements were for a B-rep model with all poly loops triangular, no through holes and no explicit definition of the plane defining the face surface. There was a discussion of how these requirements might be met in practice and three possible alternatives were considered.

- a) The creation within AIC 512 of a new subtype of faceted brep shape representation, this would apply additional constraints to ensure that all faces were triangular with a single bounding poly loop, with this solution it might be difficult to derive the geometry (plane) of the face surface as required in AIC 512. Before adopting this solution, which might appear as a part 512 DIS ballot comment, it will be necessary to investigate the effect on APs and implementations currently using AIC 512.
- b) The creation of a new module or AIC specifically for triangulated models. This could include a triangular face entity as a subtype of face surface in which the face geometry is derived and a triangulated brep as a subtype of faceted brep with appropriate additional constraints.
- c) The direct use, from an RP application protocol of the face and faceted brep entities from part 42 with the creation in the AP of the specialized subtypes described above.

On Wednesday members of the shape representation committee participated in the WG12 plenary meetings. At this meeting the potential requirement for a technical corrigendum to part 42 IS to correct known errors in the EXPRESS was described by the Convener who is starting an information gathering exercise for all the IS resource parts EXPRESS models.

Thursday began with a joint meeting with WG3/T12 Building and Construction to survey the impact upon their work of changes to the new editions of resource parts and EXPRESS version 2. This meeting began with a presentation of the additions to part 42, particularly in the area of CSG primitives, most of which had been introduced at the request of this team. Members of T12 agreed that the majority of their geometric requirements had now been met but expressed a preference for a simple parametric description of some CSG shapes, such as the truncated pyramid. There was still an unfulfilled requirement in some of their applications for the communication of incomplete geometric descriptions such as the square to round blend in which the intermediate shape is not defined. Another specific request, which might appear as a CD ballot comment, was for a clothoid curve entity, provided this has a complete description as a parameterized curve  $r(t)$ , this would not be incompatible with the other curve subtypes in part 42. After some discussion it was suggested that most of the AP requirements might be met by specializing part 42 and part 43 entity definitions within the AP or module. In particular T and I section beams could be defined by special subtypes of faceted primitive with additional constraints and descriptive text to document the geometric significance of the listed points. It might also be possible to represent shapes defined by profile curves as specialized subtypes of geometric set or of representation with added constraints and descriptive text.

Phil Spiby made a presentation on the extensions to be provided in EXPRESS version 2. He said that this would contain conformance classes, the first of which would correspond to the IS version of EXPRESS. He showed in detail how the new expression and evaluate constructs in EXPRESS2 could be used. This appears to provide a very powerful facility and Phil Kraushar suggested that when this is available it will be possible to simplify the mathematical representation schema without reducing the capability.

After the joint meeting Bill Anderson reported on the PDES Inc geometric accuracy work. He reported that Tom Peters and Step Tools Inc. had been using the DT-NURBS software to develop some diagnostic tools for the assessment of geometric accuracy problems. Appropriate model quality values are pre-defined in the originating system and the object of the tools, when a data exchange problem occurs, is to re-compute the quality value for the transferred model in order to determine whether the problem arises in the sending system or lies in the receiving system. He said that initial work in ProSTEP had used distances from an edge curve to end vertices as quality values, other values such as gaps between bounding edges and face surfaces could be considered as quality metrics. He said that the current tools needed further development to make them easier to use and to provided better associations between detected potential errors and geometric and topological elements. He also said that there was a possibility of using some mass property measures as a further check on model quality. Part 42 N145 was reviewed again and some minor editorial changes were suggested. Phil Kraushar was concerned that some of the higher level entities in the mathematical representation schema were not declared to be abstract supertypes; it was explained that this was to maintain consistency with the conventions used in other schemas in part 42 and in other IR parts. (The ability, or not, to instantiate supertypes is dependent upon the interface statements and rules defined in APs.) The creation of a trimmed volume entity as a logical successor to a rectangular trimmed surface was also discussed, this might, if required, be defined as a subtype of solid model. A possible generalization of the rectangular pyramid to accommodate truncated and skewed forms in a single entity definition (as in eccentric cone) was discussed, these might be considered as CD ballot issues.

At the end of the meeting a provisional agenda for the Bad Aibling meeting was drafted:

Monday p.m.: Joint meeting with parametrics to consider mutual requirements.  
Review of new part 42 SEDS issues.

Tuesday a.m.: Review of interface of mathematical representation schema to engineering analysis core model and other EA requirements. (with EA WG3 T9)

Tuesday p.m.: Review DMAC proposals and prepare report for WG12 plenary.

Review early CD ballot comments on part 42.

(WG12 plenary Wednesday)

Thursday a.m.: Geometric precision - update report (Bill Anderson)

Review any early ballot comments on part 42 CD.

Thursday p.m.: Plans for part 42 CD ballot resolution workshop.

Minutes prepared by Ray Goult

Notes:

It is hoped that part 42 version 2 will be able to start the CD ballot process in the near future; members of the committee are requested to bring any early ballot comments to the next meeting. AIC Parts 511, 512 and 514 are currently with QC for final verification before commencing DIS ballot.

Part 513 has passed the CD ballot and will be prepared for DIS.



## WG12/PARAMETRICS

**Attendees:** Mike Pratt, NIST, USA (Chairman); Robert Aish, Bentley Systems, USA; Bob Allen, NIST, USA; Bill Anderson, SCRA, USA; Jenny Ang, Gintic Institute, Singapore; Rogerio Barra, SCRA, USA; Richard Baumann, IPK Berlin, Germany; Craig Brubaker, Newport News Shipbuilding, USA; Bill Cain, Lockheed Martin Energy Systems, USA; Noel Christensen, Allied Signal, USA; Tal Cohen, Georgia Tech, USA; Chuck Eastman, Georgia Tech, USA; Gerd Ehinger, IBE, Germany; Michael Endres, ProSTEP, Germany; Wade Gibbs, Lockheed Martin, USA; Ricardo Goncalves, Uninova, Portugal; Ray Gault, LMR Systems, UK; Hiroyuki Hiraoka, MIT, USA; Pascal Huau, GOSET, France; V. Kalyanpasupath, Bentley Systems, USA; Ben Kassel, NSWCCD/NIDDESC, USA; Elliot Kimber, ISOGEN International, USA; John G. King Jr., Newport News Shipbuilding, USA; Kazuya Kobayashi, Toyama Prefectural U., Japan; Tom Kramer, NIST, USA; Phil Kraushar, Boeing, USA; Bruce Ladewig, Ford Motor Co, USA; Helium Mak, NRC, Canada; Akihiko Ohtaka, Toyota Soft Engineering, Japan; Greg Paul, Lockheed, USA; Guy Pierra, LISI/ENSMA, France; Gerry Radack, CTC, USA; Venkat Rajan, Wichita State University, USA; Daniel Rivers-Moore, RivCom, UK; Nigel Shaw, EuroSTEP, UK; Robert Schuler, NSWCCD/NIDDESC, USA; Nikolay Shulga, Bentley Systems, USA; Guenter Staub, RPK, U. of Karlsruhe, Germany; Nobuhiro Sugimura, Osaka Prefectural University, Japan; Emery Szmrecsanyi, Chrysler Corp., USA; Tom Warren, Oklahoma State University; Bernd Wenzel, EuroSTEP, Germany; Miyako Wilson, Georgia Tech, USA

Monday 1030 - 1200

The meeting was chaired by Mike Pratt, and started with a Parametrics plenary. No omissions or corrections had been raised regarding the Minutes of the Florence meeting, previously circulated. For the Long-term Parametrics subgroup it was noted that Dick Wittenoom could not be present in Orlando, though a small number of participants in the long-term subgroup were present and a room was available for separate LTP discussions if required. A major activity during this meeting would be planning the migration of the ISO 14959 work into ISO 10303 (STEP) as required by SC4 Resolution 350 passed in Florence.

Several presentations to be given during the meeting were identified, and the agenda reviewed. Mike then gave brief presentations on the following topics:

- OCAI Project: this is now more than one year into its three-year lifespan. Although the original source of funding is no longer available due to a Federal budget cut, industry funding is being negotiated by the project managers, D. H. Brown Associates, for continuation of OCAI. However, the focus of the project is now more on a standardized means of accessing feature information in a data repository rather than, as previously, direct access to that information in the native CAD model. For that reason the project is now of less immediate interest to the work of the Parametrics Group, since our desired functionality requires direct interaction with the CAD system. We should nevertheless continue to monitor OCAI since the feature model developed could be important for our future work.

[Don Brown of D. H. Brown Associates has since said that the transition to the new arrangements is almost complete, the project is progressing well and an announcement will be made on this exploder within the next few weeks].

- WG12 N106: As mentioned in the Florence minutes, Mike has written this report as a contribution to the development of the history-based modeling capability in the Parametrics Framework document. He

briefly surveyed its main points for participants who were unable to get to Florence, and reported that he has extended it to cover the EREP (Editable Representation) proposal put forward by Chris Hoffmann. The revised version will be put on SOLIS shortly after this meeting.

- SC4 Resolution 350: Mike put forward a plan whereby the (Short-term) Parametrics Framework document currently being edited by Noel Christensen is split into three parts that will become new IRs within ISO 10303. These will cover

- \* Parametrization and explicit constraints for B-rep models
- \* Resources for history-based modeling, and
- \* A standardized API for history-based modeling.

Introductory material from ISO WD 14959-1 (WG12 N087) will become ISO 10303 introductory material, either by extending ISO 10303-1 (currently under revision) or possibly as a new part in the 1-series

of STEP. The plan recommended that the Long-term (General-case) Parametrics work continue under the previous ISO 140959 project as a Technical Report Type 2, which is Dick Wittenoom's preferred option. The plan was generally acceptable to the participants present in this session.

Monday 1300 - 1500

The first session of the afternoon was a joint meeting with the WG12 Shape Representation Group. The Parametrics migration plan was discussed and generally agreed to be reasonable. Bill Anderson mentioned that he is intending to develop a trial parametrics module for AP203 by May 1998, based on the ENGEN work but possibly using P-LIB Part 20 for mathematical expressions rather than the 'intelligent string' approach advocated in the previous version of the ENGEN Data Model (EDM4.6). A new version of the EDM is being prepared. Noel Christensen gave a brief presentation on the distinction between the Part 42 swept volumes and the volumes defined by parametric sweeps in the Parametrics Framework.

On the Shape Representation side it was noted that a request had been received for a specialization of the faceted boundary representation containing only triangular facets. Such a representation would be compatible with widely used formats for various applications, including STL for solid freeform fabrication and VRML for virtual reality.

Monday 1530 - 1700

After the break, Parametrics met jointly with the WG10 Technical Architecture Group. The Parametrics migration plan was again discussed and deemed to be acceptable. The topic of expressions and attribute references in the Parametrics Framework was also raised, and some of the possible solutions outlined. Bernd Wenzel offered the opinion that the currently preferred 'intelligent string' approach to expressions could be adopted provided a sufficiently good technical case could be made for it, despite the existence of other less radical solutions such as P-LIB Part 20. Bernd advised against reliance on new capabilities in Version 2 of EXPRESS, however, since these will not be available for several years to come and it would not be a good thing for Parametrics to develop the only STEP IRs making use of it. Provided some suitable alternative is identified for immediate use we can keep the option of adopting EXPRESS v2 at some appropriate future time.

Tuesday 0800 - 1200

The Parametrics Group started by reviewing feedback received from WG10 the previous day. There was some discussion as to how the 'intelligent strings' method of representing expressions could work in the context of the SDAI, and no fundamental problems were perceived. Noel Christensen then gave a mini-tutorial on the overall modeling approach taken in the Parametrics Framework, for the benefit of new

members of the group. He also described how dimensions are handled, in answer to a question from Akihiko Ohtaka.

There followed two presentations:

- The persistent naming problem. Mike Pratt gave an overview of some work on this topic by S. Raghothama and V. Shapiro of the University of Wisconsin-Madison. Their aim is to provide a sound theoretical foundation for a solution to the problem, which has so far only been attacked by heuristic methods. Participants requested a list of references on the topic of persistent naming (see Addendum 1).
- The FunSTEP project. Ricardo Goncalves outlined the status of this ESPRIT project concerned with the furniture industry. FunSTEP is in its final phase, and a demonstration of the results is scheduled for Cologne (Koeln), Germany, in January 1999. A new follow-on project (ECOS) will start in mid-1998, mainly aimed at electronic commerce in the furniture industry, and including electronic catalogs. However, the FunSTEP project had not been able to include much parametric capability in their models. Pure scaling (independently in each of the three dimensions) is currently possible, and their model also supports discrete sets of allowable dimensions in certain cases. A worldwide FunSTEP Interest Group has been set up, currently having 35 members, and there is the possibility of an IMS project proposal in this area. Also there is ongoing discussion of a proposal for a new STEP AP for use in the furniture industry.

The last item of the morning session was a discussion of an example that Phil Spiby of WG11 had prepared to illustrate how EXPRESS v2 might meet some of the Parametrics requirements on mathematical expressions.

The example was:

```
ENTITY fixed_shape_block;  
  length : REAL;  
  width : REAL;  
  depth : REAL;  
  shape_constraint : EXPRESSION(LOGICAL);  
WHERE  
  WR1: shape_constraint;  
END_ENTITY;
```

This would allow the following instances:

```
#1 = FSB(1.0,1.0,1.0, {(width = depth) AND (width = length)})  
#2 = FSB(1.0,2.0,4.0, {(width = 2*length) AND (depth = 2*width)})
```

N.B. { and } have been used as delimiters in the physical file for purposes of illustration, though of course that is not standard usage.

The provision of instantiable functions in EXPRESS v2 was welcomed, but the mechanism proposed for representing constraints in an EXPRESS model was felt to go beyond what we had in mind. Noel Christensen was concerned about the scope of the variables used in the example - were they local to a particular entity, or could they be referenced from other entities?

Tuesday 1300 - 1500

After lunch Parametrics met jointly with WG2 (Parts Library). Bill Anderson made a presentation on the current state of the ENGEN project, and mentioned once again that P-LIB Part 20 may be used in a

trial module in a demonstration of updated capability for AP203, or that a simpler expressions schema might be developed for the same purpose. This led to further discussion of means for achieving instantiation of expressions in STEP models. Guy Pierra emphasized that the P-LIB approach automatically guarantees the correctness of expressions, whereas other approaches require validity checks to be performed externally.

Mike Pratt presented the Parametrics migration plan to WG2 for their information. There was some discussion regarding the adequacy of P-LIB Part 31 for the standardized API requirement. However, the Parametrics need goes beyond what is available in Part 31, in several respects.

Guy Pierra said that WG2 might be able to contribute to the work of Parametrics, but that the decision by the Parametrics Group that the Parametrics Framework is to be the master document was inhibiting such contributions. Mike Pratt promised an early response on this point, after further discussions within the Parametrics Group.

Now that some of the P-LIB resources are approaching the IS status, WG2 has requested WG12 to take over responsibility for them, since the WG12 remit covers all SC4 Integrated Resources. The parts concerned are 20, 26 and 42. Part 31 should follow soon. A formal decision on this transfer will be taken by SC4 in Bad Aibling.

Tuesday 1530 - 1630

After the break Parametrics meet jointly with WG3 T14 (Product Documentation), the group concerned with harmonizing STEP and SGML. A PWI is currently being prepared for formal initiation of this work. Mike Pratt briefly reviewed the Parametrics requirements for intelligent strings and for attribute references in Part 21 and other implementation environments. There seems to be no problem about the first - all EXPRESS strings will be legal and interpretable when the harmonization is in place. However, the second requires an extension of EXPRESS syntax if we are to use such constructs as #14.radius for to refer to the radius attribute of a circle instance #14. One suggestion is that Parametrics could use EXPRESS-I; in fact this had been reviewed some time ago, and nobody could remember why it had been rejected (\* see below). But another suggestion is to use HYTIME (IEC 10744, 1997), which provides a very general means of accessing properties in structured data. HYTIME is an associated standard of SGML (ISO 8879, 1986 + Technical Corrigendum, 1996). It is not only included in the harmonization effort, but may immediately be formally referenced by STEP parts. In the meantime, a formal abstract data model for SGML and HYTIME is being developed by WG3 T14 in EXPRESS.

[\* NOTE: EXPRESS-I was discussed in the Kobe meeting, 1996-06, and Ray Goult said there that he thought it was very useful for certain applications - in his case developing Abstract Test Suites - but that there would be certain disadvantages in using it for Parametrics purposes. See the Minutes of that earlier meeting.]

Noel Christensen provided some examples of the kind of usage Parametrics has in mind, and Elliot Kimber gave an overview of the nature and capabilities of HYTIME. It was agreed that Parametrics would look into the possibilities of using HYTIME, and a further joint meeting with WG3 T14 was agreed for Bad Aibling.

SGML information can be found at <http://www.ornl.gov/sgml/wg4>, and HYTIME information at <http://www.hytime.org>

Tuesday 1630 - 1730

In this last hour presentations were made by Nobuhiro Sugimura and Venkat Rajan on extensions to the assembly model presented in Florence. The JSTEP model now contains, in particular, an improved

method of handling fastener information. Also, a graphical method has been developed for representing relations between instances of parts in assemblies. Venkat Rajan's paper lists several aspects of the model as presented in Florence that he feels need further consideration to make it suitable for a wide range of applications. The assembly papers will be made available on SOLIS.

Wednesday 1030 - 1200

After the Liaison Plenary, Parametrics had a technical session in which Bob Allen gave a presentation on the outcome of a recent NIST workshop on Knowledge Based Systems (KBS). The major issues in interfacing CAD systems with KBS systems were identified, and actions recommended for overcoming them and bringing the solutions into the standards arena. This is a contribution to the work of the Long-term Parametrics subgroup. The NIST Workshop proceedings are available as a NIST report (NISTIR 6111) - contact Bob Allen for a copy (rhallen@cme.nist.gov).

Also in this session there was further discussion of the attribute access problem in the light of yesterday's meeting with WG3 T14. The fact that PDES Inc. is proposing to develop a parametric module for AP203 that is likely to be incompatible with the Parametrics Framework was also touched upon - it appears however that a module that can be developed in such a short time-frame can only address part of the overall problem.

The final topic before lunch was possible collaboration with WG2 on the Parametrics work. The Parametrics Group welcomed the suggestion of input from the Parts Library team, but as previously felt that better progress would be made on the basis of discussion of individual technical issues within the context of the Parametrics Framework (or the STEP IRs that will emerge from it) rather than on the basis of competing documents.

Wednesday 1300 - 1700

For the entire afternoon session Parametrics joined the WG12 Plenary meeting. The plan for migration of the Parametrics work into ISO 10303 was presented again and the main points accepted by WG12. The only point on which there was disagreement was the technical content of the GCP requirements document (currently WG12 N082). Dick Wittenoom was proposing to present an updated version of this as a Technical Report Type 2, but there was feeling in some quarters that this would be inappropriate. Such reports are periodically reviewed and may be voted upon for acceptance as contributions to a standard. It was felt that the Technical Report to be generated FOR GCP was likely to be more in the nature of a requirements analysis than a collection of EXPRESS schemas. In this case a TR Type 3 would be more appropriate. However, Greg Paul said he would present the migration plan, as proposed by Parametrics, to the PPC to get their reaction. It was ascertained that Part 1 of STEP is currently under revision, and that introductory material relating to Parametrics (including portions of 14959-1) can easily be added since the work is still at the PWI stage.

The next topic discussed was that of expressions and attribute references. It was pointed out that there are now multiple possible mechanisms for achieving the desired goals, and that Parametrics probably needs to identify not only short-term (possibly quick and dirty) but also longer-term solutions. The Parametrics Group agreed to prepare a report summarizing the various possibilities, listing their relative advantages and disadvantages, with the object of making decisions on the best technical approaches in Bad Aibling.

Discussion then moved away from Parametrics business, and the next topic was Part 47 of STEP. This has just achieved IS status, but it has been reviewed by ISO TC213 and found to be lacking in some respects from their point of view. SEDS issues will be raised against it. It was recommended that Parametrics should also review Part 47 thoroughly, since there are some concepts with correspondences in the

Parametrics Framework. Mike Pratt said that Parametrics would do this, though he felt that the semantics of those concepts are significantly different in the two cases.

Greg Paul then gave a short presentation on the work of the DMAC (Design and Modeling Advisory Council). There had been a suggestion of a formal SC4 liaison with this group, which represents a collection of CAD and application developers all oriented to the use of Windows platforms. They are developing a query interface called OLE for Design and Modeling, based on proprietary Microsoft OLE technology. Mike Pratt was able to provide further details - this interface is covered in his document WG12 N106, which will shortly appear on SOLIS. Other WG12 members will review the DMAC documentation (see the Web site <http://www.intergraph.com/ole/dmac.htm>) and comment on the possibilities for liaison in Bad Aibling.

The topic of P-LIB resources was next discussed. As earlier mentioned, WG2 has proposed that some of these now become the responsibility of WG12. There was some review of the documents concerned, and it was not clear that Parts 26 and 42 in particular should be regarded as IRs in the same way as STEP IRs, although it was agreed that Part 20 probably qualifies in this respect. Further review and discussion is necessary regarding this suggestion.

Thursday 0800 - 1200

Parametrics started the day with two presentations:

- Richard Baumann talked about current work at IPK on the modeling of form features. Generic parametrized feature descriptions are expressed mainly in terms of Boolean operations on simple volumes, and these may be instantiated for data transfer purposes, though a Part 21 formulation is not used in this context. User-defined features are possible. The approach used is based on EXPRESS. Constraints may be applied, both within and between features. This work clearly has strong interest for future Parametrics work on features.

- Tal Cohen presented his PhD work, which dealt with the determination of the influence of various design factors on desired engineering changes so that these can be achieved efficiently by adjusting a minimal number of factors. The mechanism used is based on a matrix approach that links the input design factors to the output factors. This work is of interest to the Long-term Parametrics subgroup.

For the remainder of the morning the major task was planning for the Bad Aibling meeting. Tasks to be undertaken before then were allocated, and the basic schedule of the meeting determined (see Addenda 2 and 3)

It was decided to hold a Parametrics Workshop on the preceding Friday and Saturday (1998-06-5/6) to get some technical work done. This proved to be difficult during the present week due to the necessity to get agreement on the plan for migrating Parametrics into STEP and the large number of joint meetings held.

Thursday 1300 - 1500

During the first part of the afternoon Parametrics met jointly with the WG3 Building and Construction group. Wolfgang Haas, leader of this group, had invited Mike Pratt to make a presentation on the Parametrics Framework so that members of his team could get some feel for the range of capabilities we intend to provide. There seemed to be significant interest, and some penetrating questions were asked. It became clear that there is considerable confusion about terminology used in the Parametrics context, however.

Following this, Greg Paul gave a status update on the revisions to Parts 41, 43 and 44, with illustrations of the way in which various upwards compatibility issues had been resolved. He also explained

current thinking with regard to the proposed new modular architecture for the SC4 standards.

Thursday 1530 - 1700

During this session Greg Paul joined Parametrics to discuss the precise wording of the Parametrics Migration Plan to be presented to the PPC for approval at 1700.

The remainder of the time was taken up mainly with the issue of expressions and attribute references. Following input from WG10 and the WG12 plenary it was agreed that a document would be prepared that lists all the available options, both short-term and longer-term, and evaluates them from all the relevant points of view. Mike Pratt agreed to prepare a skeleton of this document, which would then be circulated for further input, with the intention of having it completed for the Bad Aibling meeting.

This concluded the Parametrics meeting in Orlando.

US Delegates' Meeting, Thursday 1900 - 2000

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At this meeting Mike Pratt met Greg Paul, who told him that the PPC had agreed to the following Parametrics Migration Plan:

(1) Material from 14959-1 (Parametrics Overview and General Principles, WG12 N087) will be submitted as appropriate as extensions to ISO 10303-1, for which there exists a PWI for a revised version.

2) An NWI will be submitted for a new STEP IR covering the provision of parametrization and constraints for explicit STEP models. Material for this IR will be derived from the current Parametrics Framework document (WG12 N022). The NWI will be ready by 1998-03-31 for an SC4 letter ballot prior to the Bad Aibling meeting.

3) A PWI will be submitted for a new STEP IR covering the provision of history-based models in STEP. Material for this IR will also be derived from the current Parametrics Framework document (WG12 N022). The PWI will be ready by 1998-03-31 for an SC4 letter ballot prior to the Bad Aibling meeting.

4) The existing technical requirements document for General-case Parametrics (WG12 N082) will be extended and submitted to SC4 as a Technical Report Type 3.

The primary difference between this and the originally submitted plan is that the Technical Report in 4) is Type 3 rather than Type 2.

\*\*\*\*\*

ADDENDUM 1: Persistent naming references

S. Raghothama and V. Shapiro  
Boundary Representation Variance in Parametric Solid Modeling  
Report SAL 1997-1  
University of Wisconsin Madison, Spatial Automation Laboratory  
1997  
(Available at <http://sal-cnc.me.wisc.edu> - select 'publications').

V. Capoyleas, X. Chen and C. M. Hoffmann  
Generic Naming in Generative Constraint-based Design  
Computer Aided Design, 28, 1, 17 - 26  
1996

J. Kripac  
Topological ID System  
PhD thesis, Czech Technical University, Prague  
1994

J. Kripac  
A Mechanism for Persistently Naming Topological Entities in  
History-based Parametric Solid Models  
In Proc. 3rd ACM Symposium on Solid Modeling and Applications,  
Salt Lake City, 17 -- 19 May 1995  
Editors C. M. Hoffmann & J. R. Rossignac  
ACM Press, New York, NY  
1995

R. Lequette  
Considerations on Topological Naming  
In 'Product Modeling for Computer Integrated Design and Manufacture'  
Editors, M. J. Pratt, R. D. Sriram and M. J. Wozny  
Chapman & Hall, London (IFIP Conference Series)  
1997

[ADDITIONS TO THIS LIST FROM 'PARAMETRICS' SUBSCRIBERS ARE WELCOME -  
THE LIST WILL BE UPDATED AS WORK ON THE TOPIC PROCEEDS]

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ADDENDUM 2: The tasks to be pursued following the Orlando meeting were identified as

- 1) Prepare NWI and PWI for new STEP IRs, including a draft CD for the NWI (Mike Pratt)
- 2) Review ISO 10303-1 and ISO WD 14959-1 to determine what material should move from the latter to the former. (All)
- 3) Write review document dealing with expressions and attribute references (Mike Pratt, with input from others as appropriate)
- 4) New version of the Parametrics Framework including example. (Noel Christensen)
- 5) Plan Parametrics Workshop for Bad Aibling, 1998-06-5/6 and send out notices at least eight weeks previously.
- 6) Check availability of the CAM-I AIS for STEP use (Mike Pratt)
- 7) Further work on Persistent Naming (Akihiko Ohtaka, Mike Pratt)
- 8) Review integration of the Parametrics Framework with other parts of STEP, in particular with regard to Part 47 (Mike Pratt)

ADDENDUM 3: Draft Agenda for the Bad Aibling meeting, June 1998:

IT IS PROVISIONALLY PLANNED TO HOLD A PARAMETRICS WORKSHOP ON FRIDAY 5  
JUNE AND SATURDAY 6 JUNE FOR IN-DEPTH DISCUSSION OF TECHNICAL ISSUES  
ARISING IN THE SHORT-TERM PARAMETRICS WORK. FURTHER DETAILS WILL BE



CIRCULATED NEARER THE TIME.

Monday 8th June

- a.m. (1) Opening Plenary
- (2) Parametrics
- p.m. (1) Parametrics, joint with WG12 Shape Representation
- p.m. (2) Parametrics, joint with WG10

Tuesday 9th June

- a.m. Parametrics
- p.m. (1) Parametrics
- p.m. (2) Parametrics, joint with WG2 Parts Library

Wednesday 10th June

- a.m. (1) Liaison plenary
- (2) Parametrics
- p.m. Parametrics, joint with WG12 plenary

Thursday 11th June

- a.m. (1) Parametrics
- (2) Parametrics, joint with WG3/T14 Product Documentation
- p.m. Parametrics

Friday 12th June

- a.m. Closing Plenary

The above schedule covers the Short-term Parametrics and Parametrics plenary activities. General-case Parametrics will have a separate room available all day on Tuesday and Thursday, and during this period will also arrange joint meetings with other groups as appropriate.

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Minutes submitted by Mike Pratt

## QUALITY COMMITTEE PLENARY

The Quality Committee met in plenary at the Orlando meeting. Activities of each team were reported by the team leaders.

### Process Improvement –Sheila Lewis, Tony Stewart

Requirements from customers have led to a proposal for changes to the documentation of APs. Next steps are to gain consensus on the changes, and plan for implementing the changes. The need to facilitate integration of SGML tools will be addressed by a proposal from RivCom. Everyone agrees that SGML is the best way forward, but the infrastructure (tools and DTDs) needs to be put in place and that requires special expertise.

### Methods and Metrics – Julian Fowler

Starting 1998/1/1 DIS parts will be required to conform to the new ISO Directives Part 3. On 1998/9/1 FDIS parts will be required to conform to the new ISO Directives Part 3. Julian Fowler and Rob Anderson are co-leading a tiger-team effort to revise the Supplementary Directives (SD) to reflect the new ISO Directives. The work of the tiger team has been divided into three phases. The first phase focus is to identify effect on part editors. This phase was completed by providing the recommendation that editors use QC N044 in conjunction with the SD (SC4 N537) to produce correct parts. Both documents are being marked-up in HTML so the notes on changes will be linked to the affected areas of the SD (on SOLIS 2/98). The second phase will focus on removing non-value-added requirements and separating document content from format. The third phase will focus on tools for editors with SGML and Word being the documentation environments supported.

### Production Support - Jesse Crusey

The Production Support team conducted a qualification workshop for 10303-210. The document was published using SGML and was one of the cleanest documents, in terms of format, that the team has seen. The use of SGML is highly encouraged! During this workshop, areas in the methods documents that hinder electronic publishing were identified. Jesse also presented the table naming resources for each part. Several parts do not yet have resources identified.

### Change Management – Dick Wandmacher

Dick has developed recommendations for SC4 handbook changes regarding SEDS procedures and proposals for the next STEP and SC4 milestones to be reviewed this week in his meeting.

### Process Improvement:

The Process Improvement team met Friday morning to discuss AP document publication improvements. A plan for development of a complete set of SGML DTDs was initially discussed. It is thought that given a design strategy for the DTDs, and a DTD to start from, the other necessary DTDs could be developed by SC4 voluntary resources with guidance from SGML experts.

The best way to prepare for migration to SGML is to use a consistent set of Word style sheets. This will facilitate “autotaging.” Draft Word style sheets corresponding to the revision to the SD will be available in Bad Aibling.

### Production Support:

The team conducted a preliminary review of 10303-226 to provide early guidance to the AP development team.

One objective of the Quality Committee is to provide training opportunities for SC4 projects that will enable them to produce high quality products. At the Orlando meeting, a training class for new Quality resources was provided Sunday from 8 am - 12 noon. An ISO 9000 Overview was provided Monday evening from 5 - 7 pm.

A class detailing changes to the Supplementary Directives due to the new ISO/IEC Directives Part 3 is planned 8 am - 12 noon Sunday at the Bad Aibling ISO meeting. Part editors for all SC4 parts are

encouraged to attend. The changes will be “hot off the presses” for Bad Aibling, and will affect SC4 parts not yet at FDIS by September 1998.

Work on revising the “Preliminary IPO/ISO Training Plan” (October 1991) to meet the current training needs of SC4 was initiated. Lists of customers and training requirements were updated. A matrix will be created that identifies training needed for each customer.

In an effort to improve the quality procedures of SC4, components needed for the SC4 quality handbook were identified.

#### **Methods and Metrics:**

The Methods and Metrics team met with WG12 and WG2 to discuss the document “Procedures for Application Interpretation” (QC N027). A schedule for progress was agreed to. Another working draft will be discussed in Bad Aibling, and the revised document will be circulated to SC4 for comment in July. The document will then be balloted as a SC4 Standing Document.

Details of the changes to SC4 N537 were presented. A detailed plan for phase 2 of the SD Tiger team was agreed to. Phase 2 is to be complete by Bad Aibling. A new version of the SD will be available in Bad Aibling, and training will be provided (see above).

Jochen Haenisch presented the quality review procedures for ISO 15926. All present agreed they are a model to be used by all SC4 standards. The procedures are based on a combination of the 10303 AP Qualification Manual (SC4 N369) and the Project Leader Checklist (QC N024). The need for a feedback loop to improve the quality of the checklist was identified.

#### **Change Management:**

A two hour Change Management meeting was held. Aspects of change to be managed by the Change Management team were identified. They reaffirmed the need to manage the introduction of changes to process to avoid disruption of existing projects. A milestone process will be used to manage change, and characteristics for identifying milestones were discussed. At the Bad Aibling meeting, a proposal to use a WEB-based system for SEDS will be discussed. Also in Bad Aibling, project reviews will be discussed in a separate Change Management session from 1-3 Tuesday afternoon.

## **QUALITY COMMITTEE/PRODUCTION SUPPORT**

### **1. Qualification Workshop ISO 10303-210**

The workshop was conducted on Jan 29, 30 and Feb. 5, 1998. The workshop attendees from the QC team: Jesse Crusey, Len Slovinsky, Pete Lazo, Robin Penley, Steve Kline (Jan 30, 1998) and from the AP 210 team: Tom Thurman, Bobby Carney, Rick Foley, Jim C, Mike Keen, Greg Smith, Larry McKee (Jan 30, 1998). This was the first part that was produced using the SGML format and the dtd’s developed Lisa Phillips of NIST. Part 210 consisted of 3000 plus pages and the only major problems identified by the QC review team was formatting changes imposed by the new ISO Directives Part 3 version 1997. One major technical problem, many informal propositions that should be formal propositions, was identified.

### **2. Qualification Training**

A four hour Qualification Training session lead by Len Solvensky of ITI was held Feb. 1, 1998. The content of the training material was well organized and covered every aspect of a document that is developed by an ISO TC 184/SC4 project team. The handout contained many examples that would aid the project teams in the preparation of the documentation of a part. The basis for this training was primarily the Supplemental Directives N537.

### **3. QC Production Support - Team Meeting**

The Production Support Team meeting was held from 800 to 1700 on Feb. 3, 1998.

Attendees: Jesse Crusey, Allison Barnard Feeney, Robin Penley, John Nazemetz, Steve Kline, Len Slovensky, Markus Mair (VDA), Hitomichi Horikoshi (JSTEP), Somendra "SAM" Singh.

The following Agenda was submitted by the Team Leader for consideration:

1. Parts in review & possible future workshops
2. QC Production Support Team Task Leader Reports
3. Review QC Transition Plan
4. Review SD Tiger Team Document
5. New ISO Directives Part 3 and updates to SD N537
6. Performing QC Review For "I" functions
7. Quality Committee Review Procedures
8. Action Items

1. Document status:

- AIC 504-508 signed off
- Part 32 FDIS sign off
- AIC 501-503, 510 DIS sign off
- AIC 511-513 Jesse has for DIS sign-off
- AP 225 FDIS sign-off
- AP 208, 204 post-review
- AP 205, ATS 305, Part 42 (new version) will go out for review
- AP 209, 212 (May), 217 (Summer), 232 (April) potential workshop
- AP 209, 216, 223, 224 did not receive part, need to reschedule workshop
- AP 226 review here at Orlando
- Part 34, not received for review, yet Congener says it was signed off in November.
- Part 225, FDIS is signed off but can't go out until an ATS 325 is submitted.

2. Task Leader Reports:

Training - Len Slovensky agreed to conduct a training session at Bad Aibling.  
The focus will be on the New ISO Directives Part 3 version 1997 and the new Draft of the SD.

Team Resources- New members added to the QC Review Team:

Marcus Mair (AP214), Diane Craig (AP208), Jochen Haenisch  
(Oil and Gas), Tom Warren of Oklahoma State University

3. QC Transition Plan:

Most of the remaining meeting time dealt with updates to the Transition Plan. Allison Barnard Feeney QC Convener presented a detailed outline of a training plan needed for all of SC4. Jesse Crusey Production Support Team Leader presented the requirements for a QC Audit based review system. The following are the slides that outline the points in Allison's presentation;

Training Approach '91 Plan

- Define categories of participants requiring training • Define categories of participants requiring training
- Define training requirements for each category • Define training requirements for each category
- Propose course description for each training requirement • Propose course description for each training requirement
- Propose course outline for each training course • Propose course outline for each training course
- Determine length of course for each category • Determine length of course for each category
- Determine the sequence of training for each category • Determine the sequence of training for each category
- Identify available reference material • Identify available reference material
- Identify voids in reference material • Identify voids in reference material
- Prioritize efforts

#### Revisions to '91 Plan Revisions to '91 Plan

- Expand scope to include all of SC4 • Expand scope to include all of SC4
- Revise customers • Revise customers
- Collect existing training materials • Collect existing training materials
- Identify commercial training available • Identify commercial training available
- Update references
- Update references

#### Categories of Participants Categories of Participants

- Original • Original
  - Integration experts: those performing integration– Integration experts: those performing integration
  - AP Liaison: educates AP team on methods, integration– AP Liaison: educates AP team on methods, integration
  - STEP Update: existing STEP resource developers– STEP Update: existing STEP resource developers
  - STEP Newcomers– STEP Newcomers
  - Editors of STEP Parts– Editors of STEP Parts
  - Interpretation experts (developing/revising APs)– Interpretation experts (developing/revising APs)
  - Integration experts (developing/revising IRs)
  - Integration experts (developing/revising IRs) SC4 NewcomersSC4 Newcomers
  - SC4 Editors– SC4 Editors
  - Methods liaisons
  - Methods liaisons

#### Training Categories Training Categories

- STEP Concepts • STEP Concepts

- STEP Documents• STEP Documents
- Integration• Integration
- Resource Model Methods• Resource Model Methods
- Modeling Languages• Modelling Languages
- AP Development• AP Development
- Conformance Testing
- Conformance Testing
- STEP ConceptsSTEP Concepts
- STEP Organizational Structure• STEP Organizational Structure
- STEP Development Process• STEP Development Process
- STEP Overview and Fundamental Concepts• STEP Overview and Fundamental Concepts
- Ballot Procedures• Ballot Procedures
- STEP Implementation Techniques
- STEP Implementation Techniques
- STEP DocumentsSTEP Documents
- Supplementary Directives for SC4• Supplementary Directives for SC4
- ISO/IEC Directives • ISO/IEC Directives
- STEP Document Life-Cycle• STEP Document Life-Cycle
- STEP Document Configuration Management Procedures• STEP Document Configuration Management Procedures
- STEP Document Framework
- STEP Document Framework
- IntegrationIntegration
- STEP Integration Architecture• STEP Integration Architecture
- In-depth Knowledge of Resource Parts• In-depth Knowledge of Resource Parts
- Integration Semantic/Syntactic Rules• Integration Semantic/Syntactic Rules
- Integration Methods• Integration Methods
- AIC Library• AIC Library
- AIM Development Methods• AIM Development Methods
- AP Integration• AP Integration
- In-depth Knowledge of APs• In-depth Knowledge of APs
- Procedures for Application Interpretation
- Procedures for Application Interpretation
- Resource Model MethodsResource Model Methods
- Resource Model Qualification• Resource Model Qualification
- Resource Model Development Guidelines
- Resource Model Development Guidelines
- Modeling LanguagesModelling Languages
- Conceptual Modeling Techniques• Conceptual Modelling Techniques
- EXPRESS fundamentals• EXPRESS fundamentals
- Advanced EXPRESS (including usage)• Advanced EXPRESS (including usage)
- EXPRESS-G• EXPRESS-G
- IDEF-0 Write• IDEF-0 Write

- IDEF-0 Read • IDEF-0 Read
  - IDEF-1x Write (including style) • IDEF-1x Write (including style)
  - IDEF-1x Read
  - IDEF-1x Read
  - AP Development AP Development
  - AP Development Guidelines AP Development Guidelines
  - Complete Example of AP • Complete Example of AP
  - AP Qualification Process • AP Qualification Process
  - AP Framework • AP Framework
  - AP Scoping • AP Scoping
  - ARM Development • ARM Development
  - AIM Concepts • AIM Concepts
  - AP Validation Testing
  - AP Validation Testing
  - Conformance Testing Conformance Testing
  - ATS Development Guidelines • ATS Development Guidelines
  - ATS Tools • ATS Tools
- 

Proposed participants for training:

Interpretation experts  
Integration experts  
QC liaisons - QC certified

SC4 Editors:

AP developers  
IR developers  
AIC developers  
ATS developers  
Language  
Language Bindings  
Testing

Categories:

SC4 Concepts - like balloting procedures, review procedures  
STEP Concepts  
PLIB Concepts  
Mandate Concepts  
Oil/Gas Concepts  
Parametrics Concept  
Engineering Analysis Concepts  
STEP Documents  
Integration  
Resource Model Methods  
Modeling Languages  
AP Development  
Conformance Testing

Concepts:

SC4 Organizational Structure

STEP Development Process  
 STEP/PLIB/Mandate Overview and Fundamental Concepts  
 SC4 Ballot Procedures  
 STEP Implementation Techniques  
 Relationship to other SC4 standards  
     STEP Documents  
     Interpretation Methods  
     Integration Methods  
     Resource Development Methods  
     Tools  
     Quality Manual

Jesse Crusey Production Support Team Leader presented the requirements for a QC Audit based review system. Jesse gave a brief introduction for the basis of the slides that he presented. The theme of that introduction was; Complete set of SC4 Standing Documents, SC4 Project team participation in QC, QC review task assignment accepted with a completed summary report, and Certification of one or more project team members assigned to QC.

#### QC Certification -

Production support team member must be:

- assigned to and Approved by the project leader for QC related task within the ISO approved project
- reading, studying, understanding, and applying requirements
- instructs project team members of the QC criteria
- conducts periodic reviews of the documents
- leads the internal review of QC criteria
- validate that all issues of internal review have been resolved.
- submit an internal summary to project leader with copy to QC production support
- Pass QC test based on the requirements set forth in the TC 184/SC4 Standing Documents for QC

#### Qualification Review Tasks participation

- accept assignments of part to be qualified
- apply QC training concepts
- inform QC Prod Support team leader of schedule conflicts
- successfully complete reviews of the six major components of the AP
- submit mark-up copy and summary document to QC Prod Support team leader

#### Qualification Tax Assessment: *Move TOTAL responsibility to project team*

- consistency checks and complete document review to be done by the project team



- should be based on spot checks, never do a 100% check of the document, project don't want resources committed to QC, they view QC as a curse.
- should try to automate the qualification process and come up with some level of confidence when we look at the part.
- tax assessment/assigned QC resource is not working satisfactorily in ALL projects
- talk to Sheila Lewis or Rob Anderson about audit procedures

#### Guidelines for Document Development

- complete set of Standing Documents for SC4 that describe UNAMBIGUOUSLY the Part document requirements required for ISO approval and acceptance
- training sessions that aid the part editors in achieving the ISO documentation requirements
- SD must be a USER friendly document

#### QC Process Plan Needed

- QC Handbook Required
- Qualification Process Documented
- QC Sign-off Requirements Documented
- When to request an Audit?

Without these basic items in place, an Audit System will have *great* difficulty in achieving the quality goals the QC Production Support Team has set for all SC4 parts sent to ISO. The consensus of the Production Support Team is that when there is a choose between quality and schedule “*quality will ALWAYS loose*”. The REAL question is how to develop an audit environment that will insure that the quality goals are always met. Another goal of the Production Support Team Leader is to be under an Audit System by year 2000. Several pilots will be initiated in 1999.

Discussions for the remainder of the day focused on Criteria for Audit evaluation, how frequent, and how should the audit be conducted.

Sam Singh of the 224 team gave the criteria he uses for the quality of a part that is assigned for review. Steve Kline of the 231 team gave a similar criteria for quality, Jesse Crusey the Production Support Team Leader gave his evaluation criteria for a quality part. There was VERY little difference between any of these approaches. The primary difference was where each reviewer started to review the document under review. It should be noted the results were always the same.

#### 4. SD Tiger Team Document review:

There was no new SD document available at the Orlando ISO meeting for QC team review or to provide input. It was determined that a joint meeting with the Methods and Metrics Team was necessary to determine the status of the new SD. The following an overview of that joint meeting:

SD Tiger Team Status and plans - Julian Fowler  
Phase 1 (complete by Orlando)

impact of changes to ISO/IEC Directives 3  
recommendations to editors  
Phase 2 (complete by Bad Aibling)  
SC4 SD  
eliminate non value-added  
separate content from format  
Phase 3 (complete by Beijing)  
Editor scan use SD N537 as modified by QC N044  
New publications of SD  
marked up in html  
cross references between N537 and N044  
Some N044 recommendations can be relaxed  
font size, layout change  
ISO reference to “host style:  
Summary of immediate changes  
listing of annexes in TOC  
ordering of annexes  
bibliography no longer an annex  
subclause to 5 levels  
layout of definitions  
boilerplate changes

numbering of examples  
capitalization of references to figures and tables  
lists” one level bullet, 2 level numbered  
font/indent for notes and examples  
font size/line spacing for headings

Phase 2 initial recommendations:

Reorganize SD contents  
link every requirement to ID3  
emphasize that SD is an interpretation of the requirements of ID3  
for SC4  
Matrix approach  
avoid repetition  
identify applicability of elements to SC4 standards

Schedule:

SD-related issues collected and logged  
issue resolution via sdtiger exploder  
before Bad Aibling (1998-05-15?)

Resources:

Project leader/Editorial” Julian Fowler

Review:

SD Tiger team members  
Need to ensure WG2/WG8 input

Links:

process improvement

## **5 Other meetings for Production Support Team during the week:**

The Production Support Team met Jointly with WG 8 the Mandate Project. This meeting was to provide guidance to those projects developing parts as to the documentation requirements defined in the SD N537. WG 8 is ready to assist in the QC efforts and are dedicated to improving the parts that are apart of their standard.

There was a Preliminary review of ISO 10303-226 conducted on 1998/02/05. QC team members attending were Sam Singh, Markus Maier, Yuanxie Janke-Zhao, Robin Penley, and Tom Warren. Although there are no required QC reviews necessary for an Industrial Review Release the 226 project leader ask for QC input and review for this part. There were MANY recommended changes stated and several very critical technical issues identified.

These minutes represent most important aspects of the Production Support team meeting at the Orlando ISO meeting .

Respective submitted by

Robin Penley Scribe/edited by Jesse L Crusey, TC 184/SC4/Quality Committee  
Production Support Team Leader

## **QUALITY COMMITTEE/PROCESS IMPROVEMENT TEAM**

Sheila P. Lewis (SPL) gave the full presentation on AP/ATS development as given to the Building & Construction Group on Monday. Mitch Gilbert suggested that codes should be assigned to the reasons for test purposes being removed and it was agreed that this would be addressed in future presentations. It was agreed that metrics should be added based on experiences to date. ABF stated she raised between 15-20 SEDS on AP202 from doing the development of ATS302. SPL to check how many issues were raised against AP221 during its CD ballot based on the ATS 321 work.

SPL and Stuart Lord to look at the old Process Model developed by Bill Conroy and Mark Palmer. It was suggested that looking at the Mandate project in detail may be a better starting point and it was agreed that SPL would spend some time with WG8 at the Bad Aibling meeting.

Tony Stewart to put together a specification for SGML environment and to seek input from other developers as to existing tools.

Rob Anderson to investigate the possibility of doing a BSI publication on how to write standards which would generate income for BSI but would be applicable to the SC4 work.

The following phases for QC/T1 work are suggested and will be discussed at the Bad Aibling meeting:

Phase 1 – By Bad Aibling meeting

<b>Task ID</b>	<b>Task title</b>	<b>Description</b>	<b>Who</b>
1-1	Supplementary	Removal of non-value added	Julian Fowler/Rob

	Directives	requirements	Anderson
1-2	Publishing environment	Write specification	Tony Stewart/Rob Anderson/Stuart Lord
1-3	SC4 Handbook/Mission Statement	Review and send comments to Howard Mason	All QC/T1
1-4	Process Model	Find	Sheila Lewis/Mark Palmer
1-5	AP Document content	Initial restructure based on QC/T1 work and AP modularization	Sheila Lewis
1-6	ATS	Develop proposal for presentation to WG3 plenary meeting.	Sheila Lewis

NOTE: It is proposed that work under 1-6 above is concentrated on in preference to 1-5. Once the work is undertaken in parallel, it will be easy to split out work as it will be developed simultaneously rather than sequentially.

#### Phase 2 – By Beijing meeting

<b>Task ID</b>	<b>Task title</b>	<b>Description</b>	<b>Who</b>
2-1	AP Guidelines	Qualification and Sign off processes	Rob Anderson/Sheila Lewis
2-2	Publishing environment	Publishing tools/good practice guide/QC process (style sheets?)	Tony Stewart/Rob Anderson/Julian Fowler
2-3	SC4 Handbook		All QC/T1
2-4	Process Model	Bright colours version of process	Stuart Lord
2-5-1	AP Document content	Proposals for group 1 documentation	Stuart Lord
2-5-2	AP Document content	AP Modularization activities review	Sheila Lewis
2-7	Interpretation/Irs	Review interpretation procedure	Sheila Lewis

#### Phase 3 – By San Francisco meeting

<b>Task ID</b>	<b>Task title</b>	<b>Description</b>	<b>Who</b>
3-1	SC4 architecture	Review new architecture	Stuart Lord
3-2	Process Model	New process model	Stuart Lord

Minutes submitted by Sheila Lewis

### QUALITY COMMITTEE/METHODS AND METRICS TEAM

QC/Methods and Metrics Team minutes were not available at time of publication.

## **QUALITY COMMITTEE/CHANGE MANAGEMENT**

**Attendees:** Anderson, Rob; Bezos, Alain; Danner, Bill; Fowler, Julian\*; Gilbert, Mitch; Goult, Ray; Graves, Gerry\*; Groepper, Meinolf; Gruttke, William; Hardwick, Martin; Holm, Torbjorn; Huau, Pascal\*; Ingenbleek, Bernd; Mason, Howard; Michel, Jean-Jacques; Mohrmann, Juergen; Paul, Greg; Price, Dave; Sandsmark, Nils; Sauter, Guenter; Ungerer, Max; Viel, Christophe; Wenzel, Bernd\*; West, Matthew

The minutes of the Florence meeting were approved as distributed.

### SEDS Form Action Item

Michael Endres presented his recommendations for improvements in the SEDS Form and the process. He suggested that the form should be divided into sections that correspond to the phases and responsibilities for processing. He presented a diagram of the process and suggested revisions to the SEDS form that was accepted by the group. These will be included in Annex I of the SC4 Handbook. There was uniform agreement that it would be desirable to have the database accessible for submission, administration and browsing on the WWW to support work on the SEDS reports. It was also desired that the forms for SEDS reports and for ballot comment submission could be made consistent so that they could be worked with the same tools.

### Handbook Changes for SEDS Process

David Price presented his recommendation for changes to the proposed new Handbook wording regarding the Change Management Team review of PWI's and NWI's. He and others proposed several other improvements to the new procedures for processing SEDS reports. These procedures place the bulk of the responsibility on conveners rather than the secretariat. It was agreed to incorporate these changes and send the revisions to the Secretariat for SC4 ballot.

### Project Reviews

The following projects were reviewed with an eye to uncovering any impact on existing standards or ongoing SC4 work that was not currently recognized:

1) EXPRESS-X, --Martin Hardwick

The work is being tested in several projects. It is found to be more algorithmic than people would like. The plan is to do a NWI and CD together. A new version will be available in Bad Aibling. It will be based on EXPRESS 1994. No immediate concerns from a change management viewpoint were identified. It should have minimal effect on other parts but it will facilitate building AP's. It has the potential for replacing the mapping tables. The work will be reviewed at a PDES Inc. workshop on the modular architecture in March.

2) 10303-42, Second Edition, Geometrical and Topological Representation--Ray Goult

This work is essentially a response to SEDS issues. There is one issue in the area of upward compatibility. This will be worked with the Implementers' Forum. Ray will report back. Ray had not checked for effects on the AIC's and will report back.

3) PWI for Data Architecture--Matthew West

At present the work on Data Architecture is too preliminary to identify serious concerns although the work has the potential for causing a rework of the 40 series parts. This will be addressed when a new work item emerges. Some serious concerns have been identified with EXPRESS and they have been presented to WG11. A technical report will be submitted later this year. ISO 15926 might choose to be affected and form the basis for development just as AP203 was for the Initial Release. Work will be coordinated with EXPRESS X and EXPRESS V2.

4) Proposed PWI to revive AP219-Dimensional measurement--Simon Frechette

This is a restart of the old AP219 with the scope expanded to all dimensional metrology equipment. The PWI should be available for the Bad Aibling Meeting. The project team has recognized the need for

coordination with 10303-47,203 and 214. The project is actively engaged with ISO TC213. The discussion pointed out the need to further evaluate the impact of a new FDIS of ISO 1101 and 10303-519. It was recognized that the work on the new AP219 could serve as a focus for improved relationships with ISO TC213 and this coordination is underway. It may serve as the basis for a revision to ISO 10303-47. In response to questions about funding, Simon indicated that there were funding available for the work at a level of \$375K for three years. The Change Management Team agreed that the proposal was suitable for circulation to national bodies for approval and support.

#### Next SC4 Milestone

The discussion began on the revisions to the milestone documents that resulted from discussions in Florence. Building on the ideas put forward by Huau, the team adopted the idea of a next SC4 milestone that would signal the completion of the "Initial Release" of STEP by March, 2002, coincident with the FDIS approval of AP214. The concept is to include in "Classic STEP" all of the existing, completed AP's and those that will depend on the existing Integrated Resources or those currently being revised. The work would be based on existing methods. The AIC's would also be included as well as any AP's currently in the process that would depend on them. This milestone would also include the completion of ISO13583, Parts Libraries as now scoped. In addition, SC4 would commit to a third milestone for third release of STEP, that will be based on the modularization work currently being developed and other improvements such as EXPRESS 2. Based on current estimates, this will be in the 2003 timeframe. There was less than consensus on the idea because of concern about the perceived message this might send, i.e. Old STEP is obsolete. It was agreed that there should be very careful presentation of the next STEP milestone. It should be seen as a completion of current work, and the beginning of new way of building and extending AP's, but not a replacement for existing functionality. A business case decision should govern which AP's might be revised for the third milestone or which AP's should commit to using new methodologies.

#### Technical Corrigenda

With the increasing capabilities of EXPRESS tools, errors have been found in the EXPRESS for some of the integrated resources and AIC's. The WG12 Convener will request that identified errors be submitted using the SEDS process on the existing IS versions so that a technical corrigendum can be prepared. This will be constrained to errors and defects only.

#### SC4 Standing Documents

The Team agreed that the review of changes to standing documents is within the scope of the Change Management Team. In particular with new methods there is a requirement to factor these into the timetables for new standards.

#### **Next Project Reviews**

The following project were suggested for project reviews in Bad Aibling:

System Engineering NWI

107 Engineering Analysis

Parametrics

Oil and Gas

Ship AP's

Japanese NWI

AP208

Product Life Cycle Support PWI

The meeting adjourned at 8:25PM.

Submitted by Dick Wandmacher, Change Management Team Leader

## STEP IMPLEMENTORS FORUM

**Attendees:** T. Cohen/Georgia Tech, V. Kalyanapasupamy/Bentley Systems, H. Mak/Can-STEP, F. Stolte/Lloyds Register, S. Dhar/ITI Michigan, T. Goosen/Lockheed Martin, L. Lauro/ Uninfo, Y. Udagawa/NCALS, T. Tanaka/Nissan, E. Szmreksanyi/Chrysler, Z. Junfeng/CSBTS, M. Merli/Aidima, R. Goncalves/Univeresidade Nova De Lisboa, M. Grau/KCS, T. Turner/ Lloyds Register, U. Langbecker/Germanischer Lloyd, Carol Tierney/ GD Land Systems, J. Nazemetz/ Oklahoma State, D. Adam/Brown and Root, M. Jones/ AUSDEC, J. Ang/Gintic, W. Freeman/SCRA, B. Ladewig/ Ford, R. Bsharah/Ford, R. Barra/PDES, Inc., L. McKee/IBM, R. Bair/IBM, P. Brorson/Volvo, C. Viel/GOSET, D. Pandit/General Motors, Y. Ishikawa/IHI, B. Schili/ABB, G. Conkol/CAMP, W. Turcotte/IDA, K. Taga/Honda, C. Grafe/ University of Hamburg, Z. Bazari/Lloyds Register, Stuart Lord/ICI Technology, M. Wilson/ Georgia Tech

10:30 Introduction to committee:

Discussion of agenda and overview - no changes or additions requested.

Issue log:

The goal is to get rid of it, but, not likely. All issues that are not considered to be within the scope of this committee will be converted to SEDS and submitted to ISO. Authors will be notified if their issue has been passed on. We will keep best practices, items to avoid (geometric constructs).

Larry reviewed the issues and summarized each item. (For details review discussion in issues log.)

Note, that lots of these issue resolutions have been agreed to by the testing organizations PDES Inc. and ProSTEP. This is a precursor to a more formal resolution.

Implementors agreements go out as a type 3 technical report and is balloted once. If it fails then it can be changed and resubmitted. If it passes it is considered to be part of the standard and could be contracted against. This is important for change management, legal, and to keep up with the CAD market changes.

11:00 Accuracy Presentation - Bill Anderson

Introduce to the problem and current thinking on possible solutions (copy of presentation in the handout for the meeting). Need a tool/mechanism to analyze the actual STEP file to check tolerance and accuracy issues. A prototype tool has been developed to this analysis. Product is DT\_NURBS and it operates on a STEP file. This tool is a public domain tool, but, you must get permission to access the software. It is being developed in conjunction with STEP Tools, Boeing, David Taylor and University of Connecticut.

11:35 Continue issues review.

12:00 Lunch

1:00 Presentation by the EPISTLE- David Adam

Project focused on process industry and working with Oil and Gas companies. Looking at the structure components piping, vessels etc. "above the mud line"

Cover objectives:

- share understanding
- define arch for data sharing
- validate EPISTLE model
- high level API
- how to implement generic model
  - = performance and efficiency
  - = Interoperability of AP's

Result was a good exchange of ideas and requirements among vendors and users who were participating in the project (Oil companies, contractors and vendors). All participants must have an active STEP project. Very much a user oriented group which was a great benefit for the requirements specifications.

This group was active with AP221 and the class library development group. They attempted to use the current library and feed back new classes for consideration. They found that approximately 400 of the current elements were useful and provided an addition 2000+ classes to be considered.

1:25 Ship Building Report- Tim Turner

Active projects in US and Europe (20 members). Currently working on 5 different AP's. This group is also doing some implementation testing relating to AP 218 as part of the SEASPRITE project. Initially have been successful exchanging ship hull information. There is also an 216 pilot implementations. Further information can be found at <http://www.oss.dk/emsa>.

1:35 ProSTEP Report- Bill Turcotte

Bill Turcotte reported on the current roundtable vendors/ processors. Current challenges are draughting, form features, accuracy and handling of processors. Hybrid or mixed models continues to be a challenge. There should be an agreement soon. There is a need for agreements on STEP layering. Part instancing and naming of component instances continues to be a challenge. Accuracy in an assembly context is also a challenge. The subject for the next roundtable is BREP voids, layers, hybrid models and production model examples.

Bill showed slides on comparison of IGES, STEP and VDAFS based on surface area, file size, and time to convert.

1:55 PDES Inc. Report- Larry McKee

Larry McKee reported on the most recent PDES inc. testing. Latest STEPnet tests rally had the largest number of participants (over 20). The focus of the test was hybrid model exchange. Accuracy is still the biggest problem w.r.t. surfaces and solids. Note that this testing uses pathological test models to expose participants to extreme cases. This type of testing with artificial models is the preferred method since a known environment with known problems is the best control group. Assumption is that even production data has problems so it's better to test real data rather than perfect data.



PDMnet had it's first test rally. Two members were pure PDM vendors and seven were CAD participants. Testing was focused on part based control relating to AP203. Round two is planned for many more tests, three PDM and seven. Focus is to help improve the translators. Still experiencing great difficulty getting the PDM vendors to participate also the metrics to judge quality and success is very different from the CAD requirements.

#### 2:25 New Issues

Q. Does the SEDS process meet Implementors need?

A. It's nice for the tracking and recording of the problem, but, it is not timely.

There is an effort to fix the bugs in the EXPRESS models for the 40 series parts. This should be transparent. If any one knows of a problem submit it to Greg Paul at [L108632@lmtas.lmco.com](mailto:L108632@lmtas.lmco.com).

#### 2:30 AP Interoperability discussion

- Process

Identify focus areas of overlap between AP's

identify specific issues

resolve issues

test resolutions

standardize resolutions

- Integrated resources changes for interoperability

- AP changes for interoperability (look to for more harmony between AP203 and AP214)

- PDM schema (This is the focus area for interoperability)

- Part 21 extensions

#### 2:40 Upward Compatibility

The upward compatibility issue is still hot. The first big issue involves updates to the integrated resources (balloted editions of parts 41,43, and 44 are upward compatible). Part 21 updates will follow. AP updates will follow. If you are interested in this then get active and express your opinion. Many important decisions will be made in the near future so speak up.

#### 2:45 PDM Schema

Current participants are ProSTEP and PDES Inc. it is focused on 203, 214 & 232 and is looking at a common subset. Detailed slides in handout. Adds more requirements on what you must include and offers more options on what you can do. Big issue is resolving the terminology. The goal is not to make the two AP's the same, but, to ensure that in the places where they overlap that they are the same. PDM schema version 1 may be found at <ftp://pdes.scri.org/pub/apinterop/pdm/pdm13>. This group is directly connected with OMG with regard to PDM enablers.

#### 2:55 STEP Modularization

Problem is that AP's are getting bigger and more complex and are starting to

cross over into each others domain. Interoperability is becoming a bigger issue. (See slides). Modules belong to an application domain that can be shared by AP's.

### 3:30 - 5/6 Implementation Testing

Presentations listed below can be either found through anonymous FTP (to [pdes.scra.org](http://pdes.scra.org) in the directory /pub/upload/impforum) or in paper form from Larry McKee ([larrym@us.ibm.com](mailto:larrym@us.ibm.com)).

GM STEP Translation Center- D. Pandit/GM

STEP and IGES Testing

AIAG- R. Bsharah/Ford

STEP and IGES Testing

ProSTEP- W. Turcotte/IDA

STEP, IGES and VDAFS Testing

NCALS- Y. Udagawa

AP 203 Translator testing

AusDEC- M. Jones

STEP and IGES Testing

STEP adoption in Australia

Boeing- K. Yee

Boeing STEP policy and direction

JSTEP- H. Horikoshi/IBM

AP 203 Translator testing

SM-ART- J. Ang/Gintic

Sheet Metal processing using AP 203/STEP

CADEX- B. Schilli/ABB

STEP and IGES Testing

Conformance Testing- S. Frechette/NIST

### Conclusions-

STEP testing is showing production quality exchanges

The results presented show that STEP provides a higher success rate

The number of large companies turning to STEP is growing

There is a need for translator/AP/STEP/SC4 stable coverage in new areas:

draughting

NC

etc.

- There is a need for higher profile centralized conformance testing activities
- A few locations spanning the globe
- It makes no sense for individual companies to each do this

Minutes submitted by Larry McKee

## SC4 HOSTS MEETING

**Attendees:** Lisa Phillips, Ellen Trager, Chuck Stark, Luciano Lauro, Martin Jones, Dick Wandmacher, Bernd Wenzel, Jochen Haenisch

Lisa Phillips, SC4 Secretary began the meeting by having everyone introduce themselves and what country they represent.

Chuck Stark (USPRO) detailed some administrative items concerning the Orlando meeting. The meeting seems to be going smoothly as of today (Monday). USPRO has a good relationship with the hotel staff which is very important to these meetings. The staff helps in moving meetings from room to room along with any audio visual equipment that is needed. Chuck suggested that the host staff always double check the meeting rooms each morning and afternoon to see that doors are open and they are set up as per the convener's request.

Chuck was still waiting for feedback concerning the tutorials and vendors that were scheduled for Sunday.

Vendor pavilion was not as well advertised as it should have been. Some were not aware that it was going to happen....people wanted to demo and didn't know that they had that time on Sunday. The event was advertised through various exploders. Vendors who participated in previous meetings were invited once again.

Chuck received comments that the reception should be spread out longer so people can visit vendors. . Should consider having vendors more than one evening. Should give hosts list of participants of vendors.

PDES, Inc. pages lists vendors who provide STEP translators.

Registration information: 250 registered as of Monday evening. Registrations came in early this time. Hotel booked early. By 10 Jan close to 200 people registered. 230 preregistered. Web page seemed to be successful in registration. Just under 50% registered through the web. Florence registered about one half over the web. Even if people are not paying ahead of time it would be nice to register on WEB. Registration form on web page in pdf file. Did not get a significant amount of people downloading the registration form from registration packet.

Minutes from Florence - action items: confirm the Norway meeting changed to Lillhammer... Martha - be sure to allow for onsite numbers for meals. Extra tables and chairs should be available during meals. Always be prepared for extra people.

Germany - fees -500 for early birds -- 600 for regular.....

P.O. not paid by NIST as of 10 days ago for Italy

Credit Cards will be accepted by Germany..

cannot delete tax - Germany has 16% tax.....Host must still pay tax for people who do not include it in their registration fee.

If people do not pay the registration fee then they should not receive the extras at the meeting. i.e. meeting rooms at hotel and meals.

Other suggestions for future meetings:

- equip printers with power point presentations.
- Ask for 4 - 8 megs of memory for each computer in the meeting office.
- Large room for SC4 meeting on Fridays....
- need one mac and printer.
- Must have virus protection
- good to keep copying statistics
- Should document empty rooms on each day - who they were assigned to --
  
- Should still require agenda's even though it is generic. WG's can update closer to the meeting.
- Financial report to be made. Fill in numbers.
- email one page announcement for meetings....point to web page.

China representative was not present at the Orlando meeting.

**ACTION:** SC4 Chair/Secretary needs to get confirmation from someone in authority in Beijing.

Attendance lists - should have name and email.

Share database with hosts. Send database to Bernd (**ACTION - Chuck**)

**ACTION:** Exploder - make up one for Hosts...(Ellen)

Minutes submitted by Ellen Trager

## **LIAISON REPORTS**

## **PDES, INC.**

PDES, Inc. Members  
Module Standardization Process  
Company Implementations Resulting from PDES, Inc. Pilots  
Production Use of STEP AP203 For Data Exchange  
Current STEP Pilot Projects

International STEP Automotive Project (ISAP)  
NIMROD 2000 PDM Pilot  
Electromechanical  
Turbine Engineering Data Exchange  
Product Data Retention  
STEP TDP Interoperability and Readiness (STIR)

### STEP TDP Interoperability Readiness (STIR)

Goal: Integrate PDM systems using APs 203 and 232; demonstrate file exchange in STEP describing packages of files in native CAD formats

Participants:

Lockheed Martin  
Northrop Grumman  
International TechneGroup Inc.

Status

Developed the Partnership Order Retrieval Tool (PORT) for subcontractors to preview and organize their incoming TDP packages

Developed the Outsourcing Database Management System (ODMS) for building and tracking TDP packages intended for outsourcing

Placement of STIR Pilot software (InSync, IntraVISION, and PORT) within Aerospace Subcontractors participating in the STIR Pilot

Pioneering in AP Multi-schema Part 21 exchanges combining AP232 and AP203 along functional units and placed in a single Part 21

Lockheed Martin began using STIR technology in parallel production in early January '98 and Northrop Grumman has planned '98 production

### Product Data Exchange Environment: Current View

Initial pilot implementations of STEP have moved into deployment

Growing availability of competitive STEP vendor tools

Incorporation of STEP in major industry business strategies

However:

Companies are still implementing single system solutions

Transition from one product cycle to another is often accompanied by loss of valuable information

Paper is still a common vehicle for product information exchange

### Product Data Exchange Environment: Two Year View

Adoption of STEP requirements into new systems procurements

State-of-the-practice file exchange for selected business processes

The emergence of shared database implementations in industry and government

Availability of STEP translators for multiple applications

Reductions in product development times

Major cost savings for technical data management

Supplier chain beginning to use STEP

Product Data Exchange Environment: Five Year View

Flexible, building block approach to implementing STEP  
Shared database implementations  
The emergence of prototype knowledge-base environments  
Widespread STEP-driven manufacturing

Near Term Priorities

Ensure upward compatibility and interoperability issues are implemented  
Move forward with PDM schema  
Release AP210 for DIS ballot  
Execute the modular extension strategy

Minutes submitted by Bob Kiggans/Martha Nicholson

**TC172/SC1 (WG4) - ELECTRONIC DATA TRANSFER AP: OPTICAL SYSTEMS DESIGN AND ANALYSIS (NODIF)**

**Attendees:** Mr. Timothy Wise (Convenor) and Mr. Mike Hayford.  
Communication with the other members of WG4 was maintained via e-mail.

o **Monday morning**

Attended the TC184/SC4 plenary and the first WG3 plenary

o **Monday afternoon**

Met with the WG3/T9 group and worked on the following:

- planned the rest of the week's meetings
- listened to a presentation of ESA thermal modelling
- reviewed the progress on APs 104/209
- received clearance to use Ms. Debbie Greenfield's Engineering Analysis Core Model (EACM) AAM
- completely converted the EACM AAM into a first-cut NODIF AAM

o **Monday evening**

Attended the second WG3 plenary

o **Tuesday morning and afternoon**

- reviewed a plan of action for attracting more P-members
- called Mr. Mike Gauvin at Optis Inc. and asked him to check with his parent company in France regarding their participation in NODIF (he sounded pretty positive)
- laid plans to approach experts from Canada and other countries
- discussed the scope of NODIF in light of Mr. Eckart Wieder's recent documents
- met with the T9 group regarding modular APs
- started editing the new first-cut AAM while comparing it with the AAM in our APPPS
- prepared the Liaison Report viewgraphs

o **Wednesday morning**

Continued work on the first-cut NODIF AAM, which originated as the EACM AAM, and now appears in PDF format as the complete EACM Part 107, which is out for CD ballot

[NOTE: This is how our NODIF Part should appear 18 months after it is approved as a New Work Item (NWI), with most of it done after 6 months.]

- The EACM AAM starts on page 225 of this PDF document--it should be consulted in order to make sense out of the next editorial notes:

asterisked ICOM boxes A21 and A22 and all their subsidiary boxes, thus indicating that material testing is out-of-scope for the optical system design activity

replaced every occurrence of the word "component", which in the aircraft industry indicates "sub-system", with the word "sub-system"

edited ICOM box A232 so that optimising an optical design comes before the preparation of the CAD models and drawings

#### o **Wednesday afternoon**

Continued editing our AAM then met with Mr. Norman Swindell, WG3/T4 "Materials Services", to learn more about material properties (GIF copies of his viewgraphs will be sent out next week):

- Part 45 "Materials" should have more properly been called "Property Descriptions"
- there is no such thing as an innate "material"
- all materials are "products"
- properties of products include:
  - knowledge of how it was obtained
  - chemical composition
  - association with product or part of product
  - qualifying properties by reliability or uncertainty
- product context is made up by a triangular relationship among:
  - Product Shape Properties (Part 41)
  - Product Material Properties (Part 45)
  - Product Process Properties (Part 42)
- these properties are interdependent
- it is appropriate for NODIF to describe "optical materials" as long as we remember that these will be mapped to "material properties of a product" in STEP

#### o **Wednesday evening**

Mr. Mike Hayford attended an SGML presentation

#### o **Thursday morning and afternoon**

In joint meeting with T9, our work on the NODIF AAM was described and received their comments on it:

- need to add more callouts and change information pathways on page 10 (ICOM A232)
- feedback among the analyses should be shown on page 15 of the NODIF AAM, even though there are notes addressing this issue on pages 11, 12 and 15
- the term "optical" should appear in many more ICOM boxes throughout our AAM
- consider how well adaptive optics, auto-focusing optical systems and other novel optical systems are addressed in our NODIF AAM
- dash the ICOM boxes that are asterisked as out-of-scope
- expand the ICOM box for initial sub-system analysis, i.e., "drill down" into more detailed boxes
- emphasise optical materials using the properties nomenclature
- add mechanisms, e.g., optical design software tools, to the ICOM boxes
- put the NODIF AAM on the web in GIF or PDF format
- e-mail our AAM in IDL format to the engineering-analysis exploder

The following were other general comments:

- the EACM AAM is based on AP 209
- APs 214 and 224 both have conformance classes that support tolerances; AP 214 appears to be a good part on which to base NODIF
- APs standardise \*information flow\* between processes, while retaining that information



- a mechanism is a vehicle that is used to accomplish a process
- at the TC172/SC1 meeting in London, LightTools should be demonstrated writing STEP AP 214 files; NODIF will likely be a module based on AP 214 whose promulgation is led by the German delegation

o **Thursday evening**

Attended the third WG3 plenary. Much of this meeting was spent presenting faster methods of developing STEP APs:  
the Application Module that carries a subset of the standard AP's information and piggybacks on top of an existing AP  
Application Data Model, or object model  
other options

- these presentations will be on the SOLIS web site at <http://www.nist.gov/sc4>
- there will be a working session Tuesday morning in Bad Aibling on harmonising the presentation of product IDs and organisational links among APs.

o **Friday morning**

Mr. Tim Wise attended a T9 session to harmonise AP 209, followed by the final SC4 plenary. At the plenary, Mr. Bernd Wentzel presented a vacation tour-guide of Bad Aibling's attractions. He also presented key cost and schedule information for this meeting; it is as follows:

- Room: 120 DM single, 150 DM double with breakfast included
- Conference fee: 890 DM if paid by mid-April, 1090 DM at the conference, 1190 DM for purchase orders
- Events: local beer festival 30 May-7 June, in the week before the conference, also an "Old-timer Rallye" 18-21 June, in the week after the conference

Also mentioned at the final plenary:

- there is a new 10-minute video coming out of PDES Inc., called "Global Business/Global Partners Supported by Global Standards", in which STEP's successes in the real world of business are shown
- advance resolutions for Bad Aibling are due by 15 March; it is possible to advance NODIF to NWI status via such a resolution

**Action items:**

- since Mr. Mike Hayford will likely not be available to come to the meeting in London, he will check on ORA's willingness to establish a telephone connection for him for a few of our meetings
- Mr. Mike Hayford will check on cost-sharing approaches to purchase an IDEF0 editor for our AAM work
- Mr. Tim Wise is to check with Mr. Wade Gibbs for a cheaper IDEF0 editor, about which he knows
- Mr. Mike Hayford will write up a summary of the SGML meeting that he attended
- Mr. Tim Wise will wrap up the AAM edits listed above before the Work Flow Manager software evaluation period expires on 15 February
- Mr. Tim Wise will scan in Mr. Norman Swindell's viewgraphs and e-mail them to the NODIF exploder
- Mr. Tim Wise will send these minutes to Ms. Ellen Trager at NIST and to the NODIF exploder

Minutes submitted by Tim Wise

## **MAPLE ARCHITECTURE, SERVICES, INTERFACES AND DICTIONARIES**

### **Introduction**

Over the recent past, manufacturing systems have become considerably more flexible and have acquired greater functionality. The numbers and types of component devices of manufacturing systems, such as NC machines, robots, automated guided vehicles, programmable controllers and manufacturing cells have increased. Manufacturing engineers are thus required to develop and update programs not only for many kinds of individual devices but also for combinations of devices. Due to this fact, the difficulty of integrating and programming the control of manufacturing operations has increased.

Manufacturing programs have an intense need for a large variety of manufacturing data, including product oriented data, process oriented data, operation oriented data and management oriented data. This diversity means that manufacturing data has a much more complicated and varied schema than the processing data encountered in other systems, e.g., business systems. Therefore, the use and management of manufacturing databases requires a manufacturing oriented approach. The concept of MAPLE is intended to provide assistance to address this need.

MAPLE assists program developers, planners and operators in a manufacturing automation environment to generate programs and prepare them for their execution.

MAPLE will assist in the following activities:

- generation of programs to control devices, cells, shop floors and factories, either manually or with computer assisted tools;

- manufacturing and process planning;

- checking and preparation of resources;

- preparation of manufacturing data sets for execution (e.g., post processing).

The outcomes of these activities are:

- manufacturing data sets (e.g., geometry, tools, technology, sequence of operations, setups, measuring, testing, handling);

- cell, shop floor and factory monitoring and control programs.

This standard for MAPLE services and interfaces builds upon the functional architecture as specified in ISO 13281-1. These standards are intended to guide software developers of MAPLE environments as well as system integrators and software tool developers

MAPLE is a building block that can be applied at any level within a manufacturing enterprise. Separate MAPLE implementations can be configured and connected within an enterprise as required.

## **MAPLE Architecture**

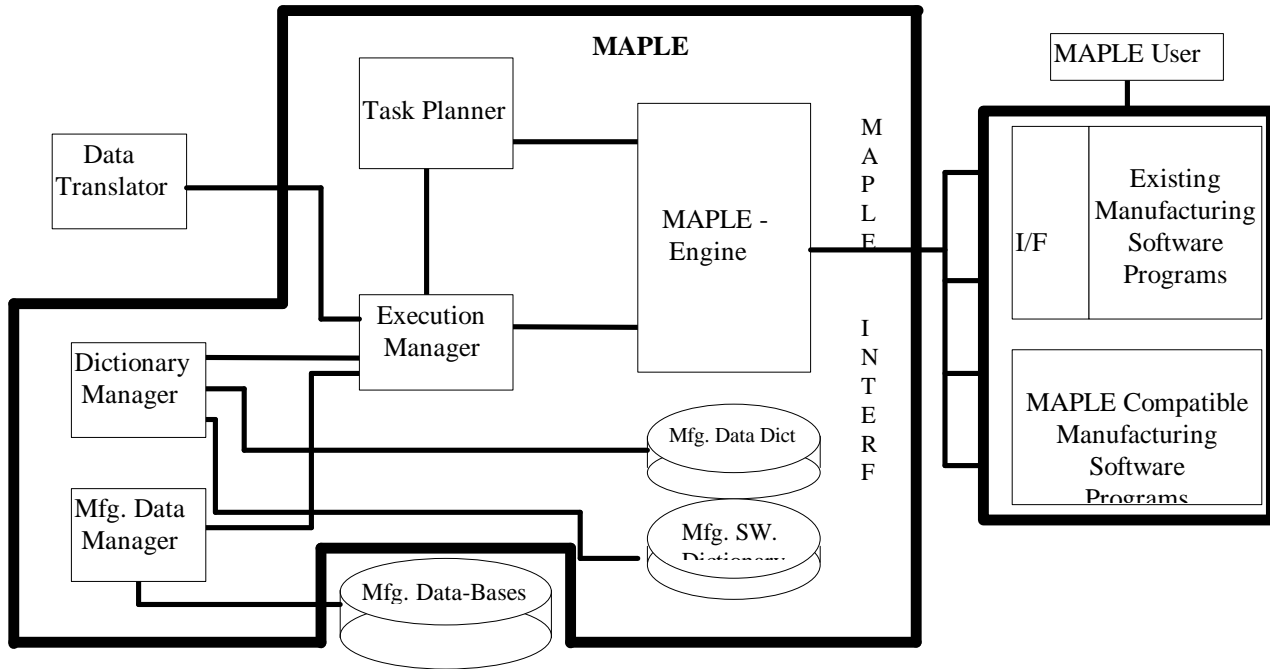
MAPLE, a manufacturing application programming environment, essentially provides a number of standardized services to the user, and interfaces with application programs, manufacturing databases and data translators through standard interfaces.

The specific implementation of MAPLE is entirely left to the developer of the the MAPLE environment, as long as the implementation is in conformance with the MAPLE services and interfaces as specified in ISO 13281- 2 (MAPLE services and interfaces).

The standard ISO 13281 - 1 (MAPLE - functional architecture) has been developed to provide an overview of the MAPLE functional architecture in order to aid in the understanding of how MAPLE services might be provided through a number of functional components within MAPLE, and their internal and external interfaces.

The MAPLE functional architecture, its components, interfaces between these components, and the interfaces to the outside world are shown in figure 1.

The functional architecture consists of the MAPLE Engine, the Manufacturing Data Dictionary, the Manufacturing Software Dictionary, a Dictionary Manager, a Manufacturing Data Manager, an Execution Manager, and a Task Planner, which provide standardized services and interfaces to the Manufacturing Software Programs, the Data Translator and the Manufacturing Databases. The user interface is through the Manufacturing Software Programs.



**Figure 1 - MAPLE functional architecture and interfaces**

The MAPLE Engine is the driver of the whole MAPLE environment. To keep track internally of the variety of types of data storage and data sources being used in the Manufacturing Databases, a Manufacturing Data Dictionary, describing data storage types and data sources is provided. Similarly, to facilitate the use of Manufacturing Software Programs connected to MAPLE, especially if a number of Software Programs have to be linked to accomplish a given capability, a Manufacturing Software Dictionary, describing the softwares' capabilities as well as the parameters required for their invocation, is provided. The actual data handling is achieved through MAPLE's Manufacturing Data Manager.

#### MAPLE Engine

The MAPLE Engine handles and controls external requests to MAPLE. For this purpose it provides an interface to all software programs connected to MAPLE. The external request is passed to the Task Planner to create an internal task list that will fulfill the original request. An internal task is associated with the management of information or performance of external actions. Execution of the tasks is managed by the Execution Manager. In reply to the original request issued, the MAPLE Engine provides the requested information, data or action as well as status information on the success or failure of handling the request.

#### Dictionary Manager

All activities involving either the Manufacturing Data Dictionary or the Manufacturing Software Dictionary are solely handled by the Dictionary Manager. These activities consist of registering, listing, deregistering and modifying data sources, software program capabilities or catalogue entries. The requests for such activities, including any associated data, come from the Execution Manager

#### Manufacturing Data Manager

The programming and control of the different component devices of manufacturing systems requires an extensive amount of manufacturing data. It includes product oriented, production oriented, operation oriented and management oriented data, and tends to have a very complex structure. The Manufacturing Data Manager provides the means of access to the Databases in response to requests from the Execution Manager. Services provided include the regular functions of a File Manager such as user access control and security, maintenance of database integrity, as well as data access to the Databases. MAPLE and the applications relying on it, performs all its data accesses (insert, delete, update, retrieve) through the Manufacturing Data Manager. The Manufacturing Data Manager shall support all the available database types.

#### Data Translator

Typically the Task Planner identifies the need for translation and invokes the Data Translator through the Execution Manager to perform a particular data translation task. The Data Translator is external to the MAPLE environment. It translates data from one specified data model to another. To do this, it accesses both the input and output data models stored in the Manufacturing Data Dictionary through requests to the Execution Manager. A special case of the Data Translator is a data filter, a software program which performs selective data translation.

#### Task Planner

The Task Planner responds to requests from the MAPLE Engine to select and sequence other Software Programs. A special manufacturing software program itself, it creates one virtual manufacturing software program from multiple manufacturing software programs. Using this special manufacturing software program, users can implement 'new' manufacturing software programs, by combining manufacturing software programs which have already been developed and their capabilities catalogued within the Manufacturing Software Dictionary.

#### Execution Manager

The Execution Manager is responsible for the execution of task lists issued by the Task Planner. For a single task to be executed, it issues control commands to the Software Program selected, in order to achieve the requested functionality. For a task list consisting of several tasks, it issues control commands as appropriate in order to achieve the requested functionality. In the case of Software Programs invoked external to MAPLE, the control commands are transferred through the MAPLE Engine and the MAPLE Interface. The Execution Manager also accepts status information from the Manufacturing Software Programs running, and provides status information to the Task Planner. It also sets aside any intermediate storage space required for data to be exchanged between successive Software Programs and manages the data flows between Software Programs and the intermediate storage space.

#### Manufacturing Data Dictionary

The Manufacturing Data Dictionary is a facility to store a machine readable collection of descriptions of data schema and their location and provide descriptions for access to the data.

#### Manufacturing Software Dictionary

The Manufacturing Software Dictionary provides a facility for storing a machine readable description of Software Programs, including their functionality and invocation, as well as the input and output requirements. All programs internal and external to MAPLE should be registered with this dictionary. In order to handle virtual software programs, which are defined in terms of direct capabilities of existing Manufacturing Software Programs, a standardised script language is required.

## Interfaces

The following describes the interfaces between the components of MAPLE and the Data-Bases, Data Translator and Manufacturing Software Programs.

### **MAPLE Interface**

This interface is one of the three interfaces between MAPLE and its surrounding. It provides the interface to Manufacturing Software Programs (Software Tools and Application Programs) and MAPLE users who gain access to MAPLE via an appropriate Manufacturing Software Program.

Already existing Manufacturing Software Programs require an interface layer to enable them to communicate successfully with the MAPLE Engine via the standardized MAPLE interface. Any new Manufacturing Software Programs being developed can be made MAPLE compatible, through conformance to the MAPLE Interface standard, and thus will not require a separate interface layer.

Control between MAPLE Engine and Manufacturing Software Programs consists of requests made by a Manufacturing Software Program for the initialization of the entire environment, or requests made by Manufacturing Software Programs for the provision of a requested functionality that can be provided by MAPLE. Program control commands can also be issued by the MAPLE Engine to Manufacturing Software Programs. For each control command there will be an appropriate status message returned. The interface also handles all data originating from or destined to the Data-Bases, the Data Translator, the Manufacturing Data Dictionary, the Manufacturing Software Dictionary, other MAPLE's, temporary data storage provided by the Execution Manager and other Manufacturing Software Programs.

### **MAPLE Engine - Execution Manager Interface**

Control between MAPLE Engine and Execution Manager consists of the Execution Manager sending program control commands for Software Programs. These consist of: initialize, idle, initiate, run, complete and terminate. For each command there will be a reply with status information. Data transfer between the MAPLE Engine and the Execution Manager consists of data references for data destined for, or originating from other MAPLE components.

### **MAPLE Engine - Task Planner Interface**

Control between MAPLE Engine and Task Planner consists of requests from the MAPLE Engine for functionalities. The Task Planner replies with status information on these requests. Data transfer from the MAPLE Engine to the Task Planner consists of meta data and/or pointers to data that are required for fulfilling the request made. No data is transferred in the opposite direction.

### **Execution Manager - Task Planner**

Control between the Execution Manager and the Task Planner consists of requests to the Execution Manager for information from either dictionary; or requests to execute a sequence of software programs. In each case there will be a reply with status information on the request made. Data transfer from the Execution Manager consists of data references for the content of the requested entry in one of the dictionaries. The data flow in the opposite direction consists of a sequence of names of software tools to be used, their location, and location of input and output file names and locations for each of these tools.

### **Execution Manager - Manufacturing Data Manager Interface**

Control between the Execution Manager and the Data Manager consists of a request to the Data Manager to create a temporary data file or to store or retrieve a specified data file; or a request to the Execution Manager for information from the Dictionary Manager. In each case there will be a reply given in form of a status of the execution of the request made. Data transfer from the Execution Manager consists of data references for data to be stored into Data Bases or data obtained from the Dictionary Manager. In the opposite direction data references are passed for data being retrieved from the Data Bases.

### **Execution Manager - Data Translator Interface**

Control between the Execution Manager and the external Data Translator consists of a request to the Translator for translation of a data file or a request to the Execution Manager for data models from the Dictionary Manager. To each request a reply consisting of status information on the requested task will be generated. Data transfer from the Execution Manager to the Data Translator consists of data references for input and output formats of data to be translated, the data to be translated and the data models for input and output data. Data passed in the opposite direction consists of data and data references for the translated data.

#### **Execution Manager - Dictionary Manager Interface**

Control between the Execution Manager and the Manufacturing Dictionary Manager consists of a request to the Manufacturing Dictionary Manager for either initialization of the dictionaries, or adding, deleting, editing or searching for and retrieving an entry. The Manufacturing Dictionary Manager responds with status information on the request. Data transfer from the Execution Manager to the Manufacturing Dictionary Manager consists of data references for the dictionary data to be stored, or, in the opposite direction, to be retrieved.

#### **Manufacturing Data Manager - Manufacturing Database Interface**

Control between the Manufacturing Data Manager and the Data-Bases consists of a request to one of the Data Bases for either initializing the database, or reading, writing or deleting a data base entry. A reply will be issued from the Data Base with status information on the request. Data transfer from the Manufacturing Data Manager to the Databases consists of the data to be stored, or, in the opposite direction, of the data to be retrieved.

#### **Dictionary Manager - Manufacturing Data Dictionary Interface**

Access from the Dictionary Manager to the Manufacturing Data Dictionary is gained through a request to the Manufacturing Data Dictionary for either initializing the dictionary, or registering, listing, deregistering or modifying a data source, with a resulting reply from the Manufacturing Data Dictionary with status information on the request. Data transfer from the Dictionary Manager to the Manufacturing Data Dictionary consists of the data to be stored, or in the opposite direction, the data being retrieved.

#### **Dictionary Manager - Manufacturing Software Dictionary Interface**

Access from the Dictionary Manager to the Manufacturing Software Dictionary is gained through a request to the Manufacturing Software Dictionary for either initializing the dictionary, or registering, listing, deregistering or modifying a software program capability with a resulting reply from the Manufacturing Software Dictionary with status information on the request. Data transfer from the Dictionary Manager to the Manufacturing Software Dictionary consists of the data to be stored, or in the opposite direction, the data being retrieved.

### **MAPLE services and interfaces**

The MAPLE services and interfaces are being developed and will appear shortly as ISO/DIS 13281- 2.

#### **Services**

MAPLE provides as a minimum some 40 services. These allow for:

- Task planning;
- Data source manipulation (register, list, deregister, modify);
- Software program capability manipulation (register, list, deregister, modify, invoke);
- Catalog entry manipulation (register, list, deregister, modify);
- Data manipulation (insert, list, delete, update, retrieve, check out, check in, translate, transfer);
- Pass through query;
- Start manufacturing software program;

Task list manipulation (start, terminate, suspend, suspend after, step mode, step task, step to, out of step, skip n, skip to, show, delete, create, start trace, stop trace, check status);  
MAPLE system related services (initialize, shut down, administer, communicate between MAPLES, access).

These services can be extended with vendor-specific services.

#### Interfaces

MAPLE will at a minimum, provide interfaces to the following:

Manufacturing Software Programs or other MAPLEs;  
Manufacturing Databases;  
Data Translator.

#### Dictionary Definition Schema

The MAPLE architecture contains two dictionaries, a Manufacturing Data Dictionary and a Manufacturing Software Dictionary. These dictionaries will make use of three catalogues:  
Data Classification Catalogue. Examples of entries in this catalogue are NC program, tool data, setup data and product data.  
Software Capability Catalogue. Examples of entries in this catalogue are post processing, monitoring and simulation.  
Data Storage Type Catalogue. Examples of entries in this catalogue are file, relational database, object database and image database.

#### Manufacturing Data Dictionary

The Manufacturing Data Dictionary is related to the Data Storage Type Catalogue, and contains two main parts: description of data sources, and Logical-to-physical Mapping. The description of data sources contains information about how to handle related manufacturing data.  
Examples of entries in this dictionary are an NC program for one specific machine, and STEP product data.

#### Manufacturing Software Dictionary

The Manufacturing Software Dictionary is related to the Data Storage Type Catalogue and the Software Capability Catalogue, and contains a description of software programs. This description consists of the capabilities and the invocation of the particular software programs.  
Examples of entries in the Manufacturing Software Dictionary are NC program editor, post processor for vendor-specific control, and simulator for CL files.

The following slides were presented at the Liaison Plenary:

## MAPLE (Manufacturing Application Programming Environment)

Udo Graefe

#### MAPLE - The business case

Easy and quick development of manufacturing programs  
Easy and quick updating of manufacturing programs  
Unified access for distributed manufacturing databases  
Unified management of manufacturing databases  
Effective utilization of manufacturing software tools  
Provision of a framework for future manufacturing software tools and data models

MAPLE Environment  
MAPLE Architecture & Interfaces  
MAPLE - services  
Task planning and manipulation  
Data source manipulation  
Software program capability manipulation  
Catalog entry manipulation  
Data manipulation  
Query pass-through  
Manufacturing program manipulation  
MAPLE system related services

#### MAPLE (ISO 13281) Status

This is now a standard -  
preparing for DIS ballot  
preparing for NWI proposal  
Where MAPLE can use SC4 Standards?  
Manufacturing database (SDAI, STEP, PLIB, MANDAT, EXPRESS, ...)  
Data Translator (EXPRESS-X)

Submitted/presented by Helium Mak

### **POSC AND POSC/CAESAR**

Additional information - POSC and POSC/CAESAR:

<http://www.posc.org>  
Changes in organisation

POSC is formally splitting its work into:

Member-fee funded maintenance activities, e.g. Version 2.3 of the Epicentre logical data model  
Project-supporter funded development activities, e.g. Interoperability and Business Objects, Shered Earth Model  
Client-funded commercial service engagements related to the use of the specifications, e.g. consulting, training, certification

POSC/CAESAR:

January 1998, organised in a world-wide membership organisation "POSC/CAESAR Association" and a technology and service company "POSC/CAESAR Services"

#### ISO 15926

An activity to develop a new standard, Integration of life-cycle data for oil and gas production facilities, initially with three Parts:

Part 1: Overview and fundamental principles

Part 2: Data model

Part 3: Methodology for creating and maintaining reference data libraries

"Stage 0" planning project to investigate additional requirements

A Part 4: Core Reference Data Library has been proposed

Status and plans for POSC/CAESAR specifications and ISO 15926

Draft POSC/CAESAR specifications:

Snapshot C/D: Jan. 97

Snapshot E: Feb. 98



POSC/CAESAR specifications:

Version 1: Dec. 98

ISO 15926 Integration of life-cycle data for oil and gas production facilities

Approved in Aug. 97 as a TC184/SC4 Work Item

Working Draft: Feb. 98

Committee Draft: Dec. 98

The POSC/CAESAR specifications are implemented in software

IBM: Mapping-tool. Commercial available in 1998

Intergraph: NOTIA - POSC/Caesar Data Warehouse (PCDW). PDM system. Commercial available in 1997

ORACLE: Reference Data Library Management tool for POSC/CAESAR. - P/C Model already implemented

Others: Quillion, I+C=S, Prism Technologies

Proposed plan for 1998

Develop ISO 15926 with four parts:

Part 1: Overview and fundamental principles

Part 2: Data model

Part 3: Methodology for creating and maintaining reference data libraries

Part 4: Core Reference Data Library

The Core Reference Data Library should be common with AP221 and possibly other AP's

Participate in the development of a new Data Architecture for SC4

Maintain technical liaison with the Product Life-Cycle Support and the PDM initiatives

Maintain technical liaison with "Core Modules" for ISO 10303 initiative

## **ISO/TC 213**

Phil Kraushar *for* Alan Jones

### **ISO/TC 213 Scope Statement**

"...macro- and microgeometry specifications covering dimensional and geometrical tolerancing, surface properties and the related verification principles, measuring equipment and calibration requirements including the uncertainty of dimensional and geometrical measurements."

### **Meeting Schedule**

Last meeting:

January 12-20, 1998 at Altamonte Springs, Florida (just north of Orlando!)

Next meeting:

June 15-23, 1998 in Ottawa, Canada

See <http://www.ds.dk/isotc213/> for details

### **STEP Liaison Activity**

3 plenary sessions devoted to learning about STEP, identifying ways to work together

Key goal:

Work revision cycles in parallel, not in series

Respond to new business needs in half the time

Opportunities Identified

AP 214/224 common module on tolerancing

Upward compatibility with requirements of proposed new TC 213 standards will be a goal

AP 219 NWI Proposal

Team shares experts with TC 213

New tolerancing concepts will be built into AP 219 at AAM/ARM stage

Need ongoing mechanism for collaboration

Resolution at Altamonte Springs

“ISO/TC 213 agreed to establish a Joint Working Group to ISO/TC 184/SC 4 envisaged to serve as a center for information exchange and joint development of GPS relevant EXPRESS-G diagrams”

Proposed “charter” for JWG

STEP experts to identify AP’s that could be affected by new ISO standards on mechanical tolerancing

dimensional metrology

TC 213 experts to identify new concepts that will require data models

Work jointly as required

Suggested Reading

ISO/TR 14638:1995

“Geometrical Product Specification (GPS) - Masterplan”

Describes the “GPS matrix” into which all TC 213 activities fit

ISO/TC 213/AG 6 N7

“Geometrical Product Specification (GPS) - Model for geometric specification”

Working paper, proposes mathematical concepts for

Software designers in CAD and metrology

STEP

Contact Alan Jones to coordinate access

Submitted/presented by Alan Jones

# TUTORIAL

## STEP DTD DESIGN PRINCIPLES WORKSHOP

**Attendees:** Rob Anderson, Allison Barnard, Peter Bergstrom, Jesse Crusey, Betty Harvey, Elliot Kimber, Josh Lubell, Eve Maler, Lisa Phillips, Gerald Radack, Tony Stewart, Tom Thurman, Tom Warren

Lisa Phillips led a discussion of the design principles for STEP Document Type Definitions (DTDs). This discussion included a brief overview of the NIST DTDs, an evaluation of the current design principles which were used to develop the DTDs, and a discussion of next steps for future work. The results of these discussions are summarized below.

NIST DTDs for STEP:

NIST has developed 3 DTDs for STEP: a publishing DTD for integrated resource parts, a publishing DTD for application protocols and an editing DTD for application protocols. The overall goal of the DTDs is to improve the quality of STEP documents and shorten the time it takes to produce them. The publishing DTDs focus on requirements for formatting and printing STEP documents according to ISO and SC4 supplementary directives. The editing DTD focuses on content. Thus far, a publishing tool and some SGML generation tools have been written to support printing STEP APs. AP 210 and AP 223 have been developed using the publishing DTD for APs and the publishing tools.

The publishing DTDs and corresponding tools are mature and require relatively minor modifications to fully support the ISO and SC4 documentation requirements. Because of this and the use of the publishing DTD already by project teams to create APs, it was decided that the focus of the workshop should be on establishing new design principles for an editing DTD to help simplify the authoring process.

DTD design principles evaluation:

Each DTD design principle was discussed and evaluated by the group. See attachment A for a listing of the current DTD design principles. The current design principles are divided into two main sections: General design principles and design principles for editing DTDs only. The general design principles include guidelines applicable to all DTDs, including handling cross references, defining table models, and complexity and granularity guidelines. The editing DTD design principles provide guidelines for determining which elements should be included and excluded and any requirements for additional elements in the editing DTD.

The panel reviewed most of the DTD design principles and provided suggested revisions. Attachment B provides a listing of the fully commented DTD design principles. Some general observations of the current design principles were the following:

- Some design principles were more of the nature of specific DTD authoring guidelines and naming conventions than high level design principles. Authoring guidelines should be based on design principles. Need to distinguish between and/or separate the two in documentation.

- Need to consider higher level issues such as organizational concerns and constraints before solidifying DTD design principles.
- Granularity of DTDs is appropriate given complexity of both documentation and repository searching requirements.
- Should continue to use a specialized (non-standard) table model in order to support specific content requirements in tables.
- Actual boilerplate text should not be in the DTDs (however attributes that reference them may be).
- Cross references should be modelled according to a standard cross referencing scheme (HyTime, XML) provided supporting tools are available. A specialized or proprietary cross referencing model should be avoided because it makes the DTDs less portable.

Next steps:

This workshop laid the groundwork for future work in planning and developing a comprehensive environment for developing STEP documents. The team recommended the following future activities:

- Develop a proposal including a formalized roadmap for future work. Because funding of any future efforts is still uncertain, this would be an essential first step. The roadmap would serve to both justify and guide future efforts. Tony Stewart agreed to lead this work.
- Hold additional workshop(s) to flesh out specific editing DTD design principles. The desired participants for these workshops would be DTD authors, customized SGML authoring tool developers, and SGML experts. NIST would likely facilitate these workshops.
- Development of a simplified editing DTD. The design principles resulting from the above workshops would be used to create an editing DTD. Likely candidates for this activity are NIST and Peter Bergstrom.
- Development of a customized authoring application based on the simplified editing DTD. The customized authoring application would provide an intuitive, easy-to-use means of creating STEP documents in SGML using the editing DTD. Example features might include pull-down lists for inserting references to other objects and auto-generation of boilerplate text. Peter Bergstrom would be a likely candidate for doing this work, but funding for his participation is not yet available.
- Explore advanced document search and navigation capabilities and requirements. The use of XML would be considered as an alternative means of creating and accessing STEP documents. This would be expected to streamline the AP development process by providing a common storage format for creating, printing and viewing STEP documents. Two external factors impacting this work will be the simplification of SC4 documentation requirements and the availability of XML-based authoring tools and browsers.

- Expand scope of DTD support. The SGML environment developed for Aps would be used a model for supporting additional document types. Need to decide what additional document types to support given resources, demand and expected benefit.

ACTION ITEMS:

- Formulate strategies for increasing interest/planning future work (Stewart, Maler)
- Document annotated DTD guidelines (Phillips)
- Create roadmap for future work (Stewart)
- Plan future workshops (Lubell)
- Feedback documentation issues and work with SD tiger team to improve SD requirements (Barnard, Anderson)

Minutes prepared by Lisa Phillips

## IPO RELATED MEETING

## CALS-PDE Standing Committee

The CALS-PDE (Continuous Acquisition Support - Product Data Exchange) Standing Committee met on Thursday on February 5, 1998 from 0800 to 1700.

The CALS-PDE Standing Committee meeting was well attended and had a diverse itinerary, in order to give a broad spectrum of CALS activities and product exchange related topics.

The 39 attendees of the meeting were as follows:

Jenny Ang, Ed Bastek, Bill Burkette, Tal Cohen, Gary Conkol, Jim Crawford, Michael Danielson, John Dunford, Linda Fowble, Bill Freeman, Mitch Gilbert, Jim Giles, Joe Gollner, Ricardo Goncalves, Jeff Guy, Martin Jones, Robert Kidwell, Steve Kupke, Luciano Lauro, Lee LeClair, Jarl Magnusson, Helium Mak, Hitomi Matsushima, John Nazemetz, Nigel Newling, Greg Paul, Mark Pearson, Alan Peltzman (chair), Clayton L. Rains, Jr., M.C. Ramesh, Raimar Scherer, Rob Schuler, Loek Smits, Ken Tanguay, Carol Tierney, Philip Tutton, Yoshihisa Udagawa, Tom Warren, and Junfeng Zhan.

The itinerary of briefings and reports was as follows:

0800-0805 - Introductions and sign-in  
Alan Peltzman, DISA, Center for Standards  
0805-0820 - B2 CITIS (Contractor Integrated Technical Information Service)  
Bill Burkett, PDIT  
0820-0840 CALS RAMP (Rapid Acquisition and Manufacturing Program)  
Bill Freeman, Team SCRA  
0840-0900 JCALS (Joint Continuous Acquisition and Life-Cycle Support)  
Ken Tanguay, Accurate Information Systems/JCALS  
0900-0940 CALS NATO  
John Dunford, NATO CALS Office  
0940-1000 CALS/STEP Harmonization  
Lee LeClair, Raytheon Systems  
1000-1030 BREAK  
1030-1100 IETM Interoperability  
(Interactive Electronic Technical Manuals)  
Robert Kidwell, Mantech  
1100-1130 CALS RIGs (Regional Interest Groups)  
Gary Conkol, CAMP

### National Reports:

1130-1200 CALS Canada  
Joe Gollner, Canadian DND  
1200-1300 BREAK  
1300-1315 CALS Australia  
Martin Jones, Ausdec  
1315-1340 CALS Japan  
Yoshihisa Udagawa  
1340-1400 a) CALS Germany  
b) Views on Interoperability  
Raimar Scherer, T. University Dresden  
1400-1430 CALS UK  
Philip Tutton, MoD UK  
1430-1500 STEP Business Concepts



Chuck Stark, USPro  
1500-1530 BREAK  
1530-1545 CALS US  
Alan Peltzman, DISA, Center for Standards  
1545-1610 New CALS Initiative  
Jarl Magnusson, Swedish Defence National Research  
1610-1630 Electronic Commerce/EDI (Electronic Data Interchange)  
Jim Giles, LMI  
1630-1650 Year 2000 Presentation  
Alan Peltzman  
1650-1655 Upcoming CALS Events and Programs  
Alan Peltzman  
1655-1700 New Business/Action Items  
1700 Adjourn

There were no new business or action items reported.

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